Brandenburgische Technische Universität Cottbus

Bachelor-Thesis

Map-Making for ERM Studies
Entwicklung von Eckpfeilern für ERM Studien

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Declaration

Hereby I declare on oath that this work in hand has been made independently and without the use of any other than the aids given below. The thoughts taken directly or indirectly from external sources are made recognisable as such.

Cottbus, January 10^{th}, 2005 Signature

Abstract

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This paper discusses the need for a concept "environmental and resource management" (ERM), and what ERM meaningfully could be. This problem is approached first by an analysis of the environmental and developmental issues. Consequently the hegemonic discourse on sustainability is questioned. Second, the paper uses Kuhn's "Structure of Scientific Revolutions" as a basis for drafting a scientific field "ERM". From the perspective of both approaches, different paradigms of environmental management are studied. Based on this analysis a fundamental problem is obtained, namely, how to make individuals and institutions co-operate and under which societal conditions co-operation can be engendered. Subsequently ERM is defined. ERM-Science is being worked out, as being goal-driven, seeking sustainability. It is pointed out that ERM, ERM-Science and its supporting scientific fields are not identical. The major findings following this method are: ERM is stipulated as an inherent social activity. Therefore the scientific field ERM needs to critically focus on the environmental and resource (ER)-manager's behaviour and her context, that both have indicated and non-indicated environmental influences upon the world. To inquire in that object of interest, the following point of view is developed: "How to make people and society not only speak about environmental problems but implement solutions?" This leads to the discussion of consequences in terms of ethical implications and methodology. Basing on these results, the legitimate problems for the scientific field ERM are illustrated. The developed definition and its consequences are applied on the three ERM-programs at Brandenburg University of Technology (BTU) (Germany) and concludes that a radical reform of the BTU-approach to ERM is required.

The Spirit of ERM?

"When, if not now? Where, if not here? Who, if not we?"

(Weber (2003) on an action weekend in Lacoma, Cottbus against the destruction of "valuable cultural and natural landscape", which is being carried out by the Swedish company Vattenfall and that is being supported by the government of Brandenburg, Germany)

Engineers

"Engineers respond to the needs of society with technical innovations. Their tools are the basic sciences. [...] Environmental engineers are in a privileged and challenging position, because their tools are the totally of man's knowledge, and their target is nothing less than human survival through making man's peace with nature. [...] And today we are directing our own evolution."

Environmental Engineers' Handbook by Liu, Lipták, and Bouis (1997, p. xv)

Ecosystem Management Research

"Academics are going back to little problems they know how to confront, not the ones which are relevant to ecosystem management."

(Berry, Brewer, Gordon, and Patton 1998, p. 66)

A Treatise of Human Nature.
Book III. Of Morals. Part I. Of Virtue and Vice in General. Sect. I.
Moral Distinctions not deriv'd from Reason.

"There is an inconvenience which attends all abstruse reasoning, that it may silence, without convincing an antagonist, and requires the same intense study to make us sensible of its force, that was at first requisite for its invention. When we leave our closet, and engage in the common affairs of life, its conclusions seem to vanish, like the phantoms of the night on the appearance of the morning; and 'tis difficult for us to retain even that conviction, which we had attain'd with difficulty. This is still more conspicuous in a long chain of reasoning, where we must preserve to the end the evidence of the first propositions, and where we often lose sight of all most receiv'd maxims, either of philosophy or common life."

(Hume 1909, p. 233)

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List of Abbreviations

ASCE	American Society of Civil Engineers
ASEAN	Association of Southeast Asian Nations
AStA	Allgemeiner StudentInnen Ausschuß
	(Union of Students)
B.Sc.	Bachelor of Science
BU	Boğaziçi Üniversitesi, İstanbul, Türkiye
	(Bosporus University, Turkey)
BTU	Brandenburgische Technische Universität, Cottbus, Deutschland
	(Brandenburg University of Technology, Germany)
BUND	Bund für Umwelt und Naturschutz Deutschland
CERI	Centre for Educational Research and Innovation of OECD
CSR	Corporate Socially Responsible
CT	Critical Theory
Dipl.	Diplom (German university degree)
EC	European Commission
ECTS	European Credit Transfer System
EM	Environmental Management
EPA	Environmental Protection Agency
	(of the United States of America)
ER	Environment(al) and Resources
ERA	Environmental Risk Assessment
ERM	Environmental and Resource Management
ERM	Course of Study About ERM
FRG	Federal Republic of Germany
fzs	freier zusammenschluss von studentInnenschaften
	(German National Union of Students)
GNP	Gross National Product
GOR	German Operations Research Society
HoF	Institut für Hochschulforschung, Wittenberg

IEM	Integrated Environmental Management
IÖW	Institut für Ökologische Wirtschaftsforschung, Germany
Lat.	Latin
LDC	Less Developed Countries
MASS	Movement Action Success Strategy
MIT	Massachusetts Institute of Technology
MIT-SLG	Massachusetts Institute of Technology "The Social Learning Group"
M.Sc.	Master of Science
MSY	Maximum Sustainable Yield
NAFTA	North American Free Trade Agreement
NATO	North Atlantic Treaty Organisation
NPO	Non Profit Organisation
OECD	Organisation for Economic Co-operation and Development
ÖI	Öko Institut (Institute for Applied Ecology), Germany
OR	Operation(s/al) Research
PhD	Doctor of Philosophy
PR	Public Relations
RFC	Request for Comment
RM	Resource Management
SEM	Strategic Environmental Management
UI	Environmental Engineering [Umweltingenieurwesen]
UN	United Nations
UNCTAD	UN Conference on Trade and Development
UNCED	United Nations Conference on Environment and Development
VT	Verfahrenstechnik (Process Engineering)
WCED	World Commission on Environment and Development
WTP	Willingness to Pay
WSSD	World Summit on Sustainable Development
WWF	World Wildlife Fund for Nature
WHO	World Health Organisation

Acknowledgement

This thesis is based on discussions with many students and professors from the course of study "Environmental and Resource Management" at Brandenburg University of Technology, Cottbus, Germany (BTU).[1] Definitely, it has been influenced by the discourse with students and professors of Boğaziçi Üniversitesi, İstanbul, Türkiye (BU), and through the debate with several actors of the German National Union of Students *freier zusammenschluss von studentInnenschaften* (fzs). I would like to emphasise that it was the fzs, especially the Committee "Reform of Study Programmes" that made me realise that it is appropriate to start critical thinking. They set me to study criticism on sustainability. I am glad to experience the discourse with all of them.

I would like to express my gratitude especially to my fellow student Stephan Wolf (BTU) who critically examined different versions of the "request for comment" (RFC) upon which this thesis is based, and with whom I enjoyed a long-lasting discussion on theoretical and practical realisation of *ERM*. Furthermore, I am grateful to the ERM-students Hauke Hermann, Kristina Neumann, Stefan Rother, and Sebastian Schulze for supporting me with acceptation and negation of arguments inside and outside of this thesis. The discussion of the RFC was only possible with the help of others students and scientists. Support through questioning the RFC was realised by Christoph Nolte, and Irina Sachs (Bodenkundliche Universität Wien) who criticised chapter 3. Especially I have to thank the students who participated in the student's seminar "Rethinking Environmental and Resource Management" in summer semester 2004; held with the financial support of the Board of Students of the *ERM* Programme. The support of the Board of Students was a noteworthy cornerstone that lead to this thesis.

Professor Gerhard Wiegleb (BTU) motivated me during the last three years to cautiously examine the students' criticism on Environmental and Resource Management (*ERM*). He

[1] For more general information about ERM cf. `www.tu-cottbus.de/environment`; about BTU cf. `www.tu-cottbus.de`

also enriched the production process of this thesis through questioning and commenting on the RFC. Thanks to several professors of faculty IV of BTU and Professor Georg Bader (also BTU) I became more sensible for some urges by professors in general: Most importantly, students "ought to" display motivation to "learn" prior to steps towards improving a whole programme. This thesis, of course, is such an attempt to learn: to learn about ERM. Stephan Elkins (BTU) kindly provided his written thoughts about environmental management (EM) for the RFC. I hope that the interested scientific community accepts this thesis as an important step of communal learning.

Professor Belgin Tekçe (BU) set me to reading papers about the history of science, especially about culture and sciences. Discussing the relationship between science and society (chapter 4) has been influenced very much by her lectures in winter semester 2003/2004 and her individual hints for me. Furthermore Dr. Andrzej Furman (BU) supported me with material for the discussion about social dilemmas in subsection 5.2.1.

Moreover, especially the (former) ERM students Elke Christoph, Susann Eisert, and Lea Herberg continuously enhanced my motivation for the RFC and for writing the thesis. Additionally, I thank them for improvements of structure, formal mistakes, and remarks about the comprehensibility and Elke for her translations, which all supported the readability of this thesis.

Finally, the student from the field of social sciences Elizabeth Manning (Boğaziçi Üniversitesi) checked carefully the arguments and writing of the core of the thesis, chapter 5.

Preliminary Remarks

This thesis is indicated to be used as one of hopefully several papers at Brandenburg University of Technology (BTU) about the question "What is *ERM*?" Since there is not much discussion about the topic yet, within this thesis it is introduced on a basic level to the reasoning on that question. Thus, no knowledge of the political discussions about the *ERM-Reform*[2] is required.

Starting with this question "What is *ERM*?", let me use the well-fitting words of Duguet in order to emphasise what is my motivation for discussing this topic: This paper, that is the product of a communal discourse, "attempts to cast light on that question, and even to offer some answers to it. It may be appreciated, rejected or hotly debated. That's all to the good, for its purpose is certainly to *stimulate thinking and discussion* in the hope that they will result in action in this field that we deem vital to the future of the" (Duguet 1972, p. 11) course of study, its role in society, societies and the environment itself.

Being often used, I shall dispel [*ausräumen*][3] an unsound argument against the total discussion: Continuously it is signalled, that one is able and allowed to participate in this discussion *only* if she[4] has already experienced a scientific education. On the contrary to this opinion I remind, that BTU expects every student of *ERM* to be able to comprehend [*nachvollziehen*] a basic reasoning to which she is introduced. Hence, every student

[2]The discussion of an ERM-Reform is connected [*hängt zusammen*] with discussions about the metastructure of courses of studies at Faculty IV (including UI, VT, UI/VT, Landnutzung und Wasserbewirtschaftung, Urban Sanitation, Nachhaltige Nutzung biogener Rohstoffe, Hydroinformatics and so on (I am not sure about all these names) ... Ba/Ma/Dipl/PhD/Dr). Furthermore the educational and scientific politics of Land Brandenburg are a major reason for courses of study being associated with the financing of entire universities. – This paper will also not discuss whether ERM is abandoned to a positive or negative political and scientific situation at Faculty IV. Such a discussion has to be shifted to other frameworks.

[3]Brackets with contents of italic style such as "concept [*Begriff*]" specify my indicated German meaning (in this example "Begriff") for the English word (in this example "concept") before.

[4]Within the whole thesis both gender are equally meant by using (s)he/her/his/him.

of *ERM* should be considered being able to comprehend a basic reasoning about what *ERM* is. Humboldt's claim, that students shall be treated as researchers (Rollin 2003, p. 88), can also be called on against this unsound argument.[5] Moreover, Kuhn emphasises repeatedly that especially young persons and the persons new to the scientific fields are the ones, who usually successfully achieve fundamental changes within a discipline (1970, pp. 90, 144).

There exists no necessity to understand all *ERM*-related sciences (engineering-, natural-, and social-sciences) in order to grasp the idea what *ERM* is. Every student is able to judge, whether she can comprehend an argumentation. As many students cannot understand BTU's reasoning, this is an indicator, that the university does not fulfil its task[6]. In the case of *ERM*, taught at BTU, until now no shared comprehensible argument what *ERM* is has been presented. Nevertheless the university has the task to offer such reasoning in the beginning of ones studies at BTU. Afterwards students should have the option to study what is regarded as important to understand *ERM*. Why exactly a conception of what *ERM* is is needed and how the term *ERM* can be understood meaningfully, these are the questions that are sought to be answered in this text.

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[5] cf. Habermas (1969)

[6] Though one could oppose it, here the assumption is used, that it is one of the tasks of a university to provide education in order to educate the students in order to enable or support them to form their own character and that society can make use of them after a temporary phase at the university.

Chapter 1

Introduction

Environmental and Resource Management (*ERM*) is a course of study at Brandenburg University of Technology (BTU) Cottbus. It has been introduced in winter semester 1998/1999. Today *ERM* comprises a Bachelor and a Master of Science[1] Programme as well as an own Doctor of Philosophy (PhD[2]) Programme[3].[4] Within the recent years, several students, also the Board of Students, within the programme criticised organisational and content matters intensively. This paper is intended to elaborate the criticism concerning the scientific fundamentals of the course of study.

According to recent PR-publications of BTU the course of study "offers an integrated approach to current environmental issues" (2003). It seems to be consent to refer with the term "environment" to nature, and not to everything in one's surrounding. Resources, however, can be considered anything, at least of the lithosphere, biosphere, atmosphere, pedosphere, hydrosphere, etc., which has a use-value.[5] Management studies, finally, are generally interested in "managerial practice and the functioning of organisations" (Alvesson and Willmot 1992b, p. 1).

To me it is challenging to study a field at BTU that covers so much. Until now the B.Sc.-

[1]The B.Sc.- and the M.Sc.-programme since 1999

[2]Lat. *philosophiae doctor*, cf. Ballantine (1983, p. 270)

[3]Since 2002

[4]cf. Wiegleb (2003c)

[5]cf. Jones and Hollier (2002, pp. 20-48)

Programme[6] contains eight modules, which demand similar qualitative priority within the curriculum.[7] Of course there exists a grading [*Abstufung*] in quantitative priority (in terms of ECTS credit points[8]) but this does not sufficiently explains what constitutes *ERM*. Furthermore, also for both, the M.Sc.- and the PhD-Programme, it is not clear what makes this course of study alleged so distinct *ERM*-like. This means it is not comprehensible why especially the name "*ERM*" is supposed top fit this combination of taught classes within the programme. It is this insufficiency of imprecision of the concept "*ERM*", what I am striving to discuss and then develop science-theoretic steps for the evolution of the course of study.

If one follows the quantitative grades within the bachelor program and the discussions in the board of Faculty IV[9] one could conclude that *ERM* tends to be "environmental engineering *light*[10] with a high content of soft-skills[11]". Certainly, it has to be avoided that the concept "*ERM*" can be used as arbitrary as "sustainable development" with its ill consequences.[12] This holds, of course, for all, the B.Sc.-, the M.Sc.- and the PhD-Programme.

Based on these perspectives and normative statements it should be clear that this paper tries to be emancipatory. Thus, it is well recognised that this text is being written within a political context.[13] It is tried to bring forward an independent critical argument, that should concern the affected people in the context of the course of study. This argument could be used for change in the course of study *ERM* at BTU; however, this highly de-

[6] in terms of BTU (2000)

[7] Whereas the reality of the formal curriculum does, of course, not correspond to the reality experienced by the students: Often courses, that have less quantitative value, do correspond with less qualitative value.

[8] For more information about credit points cf. to `europa.eu.int/comm/education/programmes/socrates/ects_en.html`, or `www.esib.org/issues/ects.php`

[9] In the years 2002 and 2003

[10] "light" in the sense of "not complete"

[11] For the claim for soft skills see Payne et al. (1995, p. x)

[12] cf. Giddings et al. (2002) and section 3.2 (p. 14)

[13] Indeed, there is no scientific context, which is not political, as will be shown in chapter 4 (p. 47).

pends on the scientific and political acceptation of this text.

Within the current discussion about a reform of the programs it has to be decided *what* is the core of *ERM*, *which* contents are needed to convey what *ERM* is, *which* contents aim at enhancing the students' self-education [*Selbstbefähigigung*] to learn and develop themselves and how to make the *ERM*-students employable[14] ER-managers with regard to the identified societal demand. If the decision (*which* priority is given to *which* content) should be comprehensible and reasonable the criterion/criteria for the decision has/have to be discussed publicly. Similar to students' in- and extrinsic interests, society also has a right to claim reasonability of *ERM* as will be shown in chapter 4, too.
Unfortunately, while discussing these four questions several problems are met. This paper serves to pay attention to some of these problems. Especially the scientific claim of *ERM* shall be examined, since, eventually *ERM* has been created as (part of) a scientific institution.

This paper is based on four arguments and structured into chapters, sections and subsections: First, the societal demand on *ERM* is discussed. This chapter is based on a historical approach (chapter 3), analysing the hegemonic discourse on sustainability. Second, scientific ways of addressing any issue are examined (chapter 4): Three sections problematise the emergence of science, the relation of society and science, and interdisciplinarity. Third, using the preceding arguments, a definition of ERM[15] is developed (chapter 5), based on a brief analysis of ER-paradigms and social dilemmas leading to the issues co-operation and societal change (5.2.1). This paradigm-analysis is carried out against the background of the preceding chapters (criticism on sustainability and science studies approach). The definition of ERM presupposes to learn more about the defining-activity itself (section 5.1). Further, the development of a framework for ERM requires

[14]The term "employability" will be discussed in chapter 6 (Employability and Teachability of Management) (pp. 104ff.).

[15]Within this text, the abbreviation ERM is written in italics (*ERM*) when the term refers to the course of study at BTU. After having discussed and stipulated a definition for an activity called "environmental and resource management", the latter is called ERM (without italics).

also to reflect on ethical implications and responsibilities of the new approach to ERM (section 5.3), and because of the idea that ERM should be supported by scientific activity ("ERM-Science") potentially suitable methodologies, which are more complex than positivist approaches, are drafted (section 5.5). It is the framework for ERM what the paper is focused on.

Subsequently, some problems of teaching management (chapter 6) and the legitimate problems and questions for *ERM* at BTU are studied (chapter 7). The paper concludes with a discussion and suggestions, what practical and political consequences of this reasoning could be (chapter 8).

In Appendix A the developed definitions for ERM Studies are collected. Since this thesis provides requirements for ERM-thesis in general, some of these requirements are practically reflected in Appendix B. Further, Appendix C lists a limited choice of journals that are relevant for the scientific discourse on ERM.

Before the whole argument is started, the method of the reasoning and reflecting shall be explained in the succeeding chapter.

Chapter 2

Methodology

In this chapter, it shall be made comprehensible how this paper has been worked out. Since the aim of the paper is to lead to a more elaborated conception of *ERM*, the highest importance is to make the reasoning understandable. Based on an understandable argument, the course of study *ERM* at BTU should be able to use this paper for its reform discussions. Figure 2.1 visualises schematically the development of the reasoning as a process. Finally, the discussion process within the scientific community in the *ERM* context, the political dimension of the thesis, and the idea of "map-making" are briefly presented.

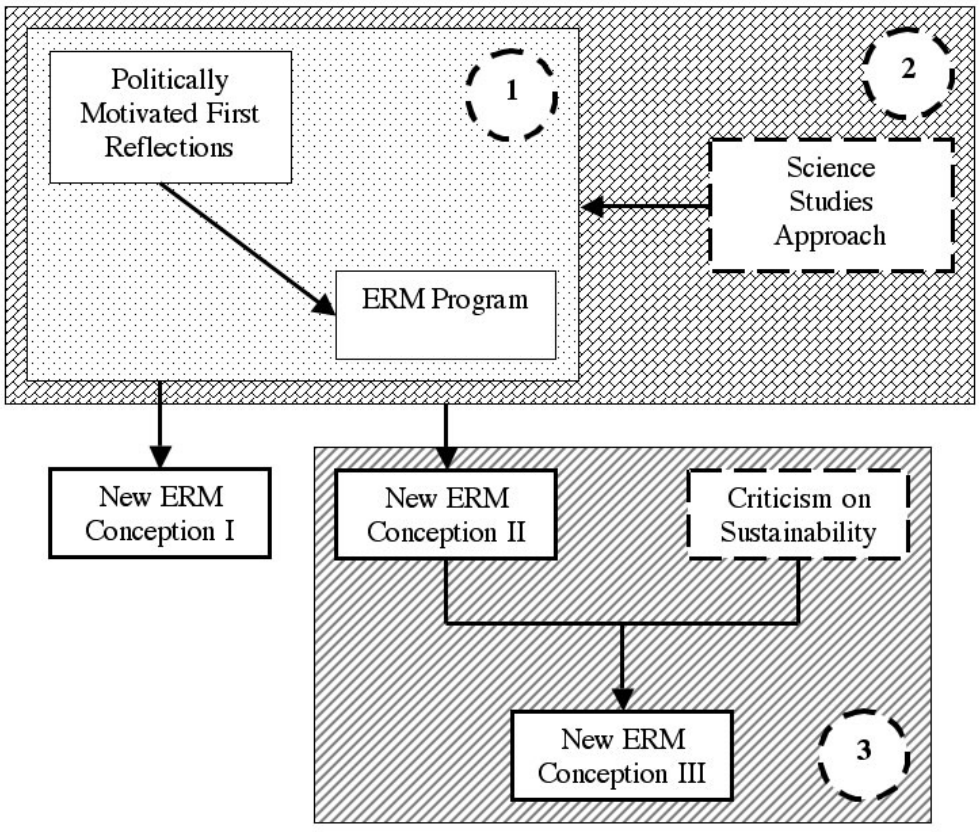
2.1 First Step: Politically Motivated Reflection on the ERM Programme

This thesis is very much influenced by my personal experiences in the *ERM* B.Sc.-programme between 2001 and 2004. In 2003 I felt that it was necessary to question the basic assumptions of my prior political reasoning[1] within the process of the *ERM*-Reform discourse.[2]

[1] A product of this reasoning is i.e. found in Lippert et al. (2003).

[2] Yet, writing these sentences in fall 2004, I cannot be really sure about this. This is because I know about the psychological tendency to confirm consistency in developments of the past from the point of view of today (cf. Gleitman, Friedlund, and Reisberg (2000, pp. 373f.)). Further, it is very difficult to

Figure 2.1: Structure of the methodological approach to the thesis. The circles indicate the three steps of the process in which the thesis has been written (First, political reflections on the ERM programme; second, applying a science studies approach on the product of the first step; third, including a critical approach to the concept "sustainable development" in the product of the second step).



Because of that motivation I asked myself how ERM can be a science. Being not satisfied with the answer to this question (cf. Figure 2.1: "New ERM Conception I") at the first hand, several scientists from the field of environmental sciences, engineering and social sciences were counselled how to scientifically approach the foundations of ERM.

2.2 Second Step: Science Studies Approach

It was recommended to me to use Kuhn's "Structure of Scientific Revolutions".[3] With reading Kuhn (1970) it became possible to approach this question (how ERM can be a science) more in depth. In the beginning an aim was also giving an elaborated definition of ERM. However, since choosing to study philosophical problems of ERM, only an idealistic definition of "should-be-ERM" can be developed. This can be contrasted with carrying out an empirical study on people who see themselves or are seen as ER managers).

Learning from Kuhn's explanation how science happens (chapter 4, p. 47) a framework of procedural characteristics of science was found. Yet, the question, in which direction the content of ERM should be searched, could only be answered by questioning in general aims of sciences. Applying Pasternack (2002), the necessity to ask for societal needs is explained. Because of this the assumption that *ERM* refers more to the complexity of managing man in nature and natural resources and not e.g. Human Resource Management was used. Yet, to better describe the field of *ERM*, the recent history of human relations to environment are briefly discussed in the beginning of this thesis (chapter 3, p. 11). This analysis lead to the concept "sustainability". Yet, as this concept is usually highly positively used, not much effort was paid to discuss it. Based on a societal need for management towards sustainability, the second step leads to "New ERM Conception II".[4]

However, after some time it became obvious that "sustainability" is not a societally undis-

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evaluate this reasoning in terms of "defensive", "political", and "critical" thinking (cf. Notturno (2000, pp. 130-134)).

[3] A summary of this text can be found at `www.erm.tu-cottbus.de/~lippein/studies/2004/kuhn1.pdf`

[4] cf. Figure 2.1

puted aim. Still, the learning environment at BTU, environmental sciences seem to be lead by the guiding principle [*Leitbild*] "sustainability"[5] Then I started to understand what is meant, when it is said that such guiding principles are designed to be fuzzy: Everybody uses the guiding principle for her own needs. Therefore, it became necessary to include a more detailed analysis of sustainable development in this thesis.

2.3 Third Step: Including Criticism on Sustainable Development

The sustainability part (section 3.2, p. 14) is very much based on Eblinghaus and Stickler (1996) and Dingler (2003), who critically examine the discourse on sustainable development. This is necessary because the mainstream concept of sustainability is not easily implement-able. It is not assumed anymore – compared with the second step – that a global and simple definition of sustainability would be helpful for ERM and this thesis.
Based on these thoughts, this thesis is approached by looking at the concept "sustainability" as evolving in a discourse. Consequently, the study of sustainable development is based on the analysis of the hegemonic discourse on sustainability. Therefore it has to be briefly sketched what are the assumptions of what discourses are.[6]
A discourse is perceived as a group of statements that address an issue. By communicating about the issue the issue is constructed – by the members of the discourse. Communication is not restricted to talk, but includes all kinds of expressions (thus, also acting). Among the participants a reality is constructed. Since the participants are always positioned in a specific social order and context the discourse cannot assume independence from i.e. power-relationships or history. Several authors (Brand (2004), Bittencourth, Borner, and Heiser (2003), Dingler (2003), Eblinghaus and Stickler (1996)) suggest that it is adequate to look at the discourses that construct the reality of sustainable development. This paper however, does not carry out a discourse analysis, but uses existing ones.

[5] cf. Tremmel (2004)

[6] Based on Eblinghaus and Stickler (1996, pp. 17-19). They, as well as Dingler (2003) (his work is being used intensively in chapter 3), based their approach of discourse analysis on Michael Foucault.

Knowing about the discourse of environment and sustainability as well as about the constitution and several aspects of sciences,[7] it is possible to develop a more elaborated framework of a scientific approach to ERM (chapter 5, p. 55; visualised in Figure 2.1 with "New ERM Conception III").

2.4 Community Criticism

The basic reasoning underlying this thesis has been discussed with several members of the scientific community, supported by an internet forum (ERM Forum 2004)[8] and a paper about that reasoning (Lippert 2004), called request for comment (RFC). An important role took the student's seminar "Rethinking Environmental and Resource Management" in summer semester 2004. Within this seminar some fundamental aspects of the reasoning were critically examined and improved. Stemming from this background this thesis still aims at providing references to critical literature on management and science as an own end.

2.5 Goal-driven Thesis

As stated above, this thesis should not be seen independently from the political discourse on *ERM* at BTU. In order to make the new ERM conceptions better usable, chapter 6 and chapter 7 are used to put the highly theoretical approach of chapter 5 into a more concrete context: Based on literature review it is therefore discussed whether management can be taught, what employability shall mean to the ERM discourse, in which historical context of reforms at higher education institutions the ERM reform process can be put, and what are more and less suitable approaches to realising ERM.

[7] cf. chapter 4

[8] Within the forum especially under the topics "What is 'ERM'?", "Do we need an ERM-reform?", "Lacoma & ERM: What is the idendity of ERM?", and "Shall our faculty renamed? '...+ MANAGEMENT' ???" aspects of the reasoning where discussed.

2.6 Map-Making

With describing the fundamental principles, minor cornerstones and providing the references of this approach to ERM, orientation towards next steps to ERM Studies is developed. This orientation can be understood as making a map, that is intended to be helpful for approaching a meaningful conception of ERM.

This does not mean, that the choice of characteristics to describe ERM Studies is the only valid choice. On the contrary I have to emphasise how natural it seems to express some characteristics in more detail and others in less detail. Map-making means that characteristics have to be chosen; and it is aimed at to make the choice for this paper comprehensible. Orientation, however, means that the user of the developed conception of ERM Studies herself finds the locations, in which more detailed analysis is needed, and further characteristics have to be expressed.

Chapter 3

Societal Demand: Sustainability and Management?

3.1 A Brief Introduction to the Reaction to the Environmental Crisis[1]

The existence and rise of a global crisis in environmental issues has been discussed within the last decades. Based on the mounting evidence in the last years it has been generally accepted that that there is "measurable environmental deterioration and what appears to be an approaching full-blown environmental crisis" (Carvalho 2001, p. 70),[2] having consequences in diverse dimensions. Among the problems are "[i]ncreasing industrialisation, explosive urban population growth, [...] unabated waste dumping, non-sustainable consumption of natural resources and unsafe use of chemicals" (WHO 2005)[3]. The diversity of problems requires reactions in many fields. For example, environmental policies have to take into account, that public actions cannot be gender-neutral in their effects (UNEP 2004, p. 5).

[1] Based on Eblinghaus and Stickler (1996, pp. 20-27) and Roose (2003, pp. 63f.)

[2] A more detailed summary of the ecological crisis can be found e.g. in Haque (2000, pp. 5-8), cf. Dingler (2003, p. 4).

[3] World Health Organisation

From ancient societies, we inherited the image of a planet, that has nearly no external restrictions for humans: "illimitable space where expansion, production, consumption, and unrestrained growth are positive paradigms for the progression of civilisation" (Werhane 2000, p. 62). At the same time Hodgson and Perdan (2002, p. 220) point to the fact that human activities had impacts since the earliest societies. Today, technology allows to alter "almost any part of the Earth" (ibid.).

"The publication of '*Limits to Growth*' by Meadows et al. in 1972" (Davoll 1978, p. 3; emphasise added by IL)[4] had an enormous impact on public opinion.[5] In this time, the report – spread by the Club of Rome – added up to the accelerating change in consciousness about the relation of environmental problems and economic growth.[6] Societies all over the world started to investigate the environment and founded institutions with the task of minimising the impacts of emissions on man.[7]

According to Jänicke et al. (1999, pp. 138f.) first the industrialised countries founded such institutions in the 1960's to 1980's. The globalisation of environmental politics became true in the end of the 1980's. The question occurs: How could this environmental consciousness in politics evolve? The reason for this seems to be the governmental discourse, that is made up of publications, which related to each other.[8] This does not imply, that these cornerstones would exemplify pure progress;[9] on the contrary, different approaches were discussed (Eblinghaus and Stickler 1996, pp. 27-28). These are summarised in the following.

[4] if not indicated otherwise emphasises are original ones.

[5] cf. Eblinghaus and Stickler (1996, pp. 28-30) and Roose (2003, p. 64)

[6] Rachel Carson's book *Silent Spring* (1962) was a milestone in creating world-wide public consciousness for environmental degradation (Ewen (2004, p. 113), Grober (2002, p. 5), Roose (2003, p. 64), and Colby (1991, p. 200)).

[7] This controlling of a finite system has been described by Werhane (2000, p. 62) with the "spaceship earth" analogy.

[8] Whereas sometimes – or even usually – the discourse of critical voices were not heard. An example would be ecofeminist voices (Eckersley 2001, p. 23).

[9] Eblinghaus and Stickler provide a table on these cornerstones of the national (German) and international discourse on environment and development (1996, pp. 29).

After the "*Limits to Growth*" Maurice Strong (Executive director of UNEP in 1973) postulated "Eco-development". This conception suggested to realise the "*Limits to Growth*" as put forward by the Club of Rome, through "a new kind of quality growth" (not zero-growth) and environmentally sound usage of resources. The conception is seen as alternative, it would lead the societies to another path (Eblinghaus and Stickler 1996, p. 31) by implying a fundamental re-destribution of wealth (to the south). Since this conception could did not fit to the dominating structures of societal production and government, eco-development became victim of the already existing variety of power demands (Dingler 2003, p. 215).

In 1974 the "*Declaration of Cocoyok*" has been published as the result of a common symposium of UNEP and the UN Conference on Trade and Development (UNCTAD). This declaration officially recognised poverty-caused behaviour of societies and poverty-caused environmental degradation as well as over-consumption in the industrialised countries (Eblinghaus and Stickler 1996, p. 32). It also disapproved the idea to catch up the development in the industrialised countries for all other countries (Astleithner 2004, p. 3). The *Declaration of Cocoyok* fostered the Dag-Hammarskjöld-Report on Development and International Co-operation "*What Now*" (1975), that was politically more radical. It claimed extensive structural changes and immediate measures, questioning "even" the right to own production means, and thus questioning capitalism.

Though other authors showed some flaws in the fundamental scientific report of Meadows et al.,[10] this basic study was a milestone in creating consciousness about the environmental issues. Further, already in 1978 Ittelson and Burkhardt stated that the "neglect[ion] of the relation between the socio-economic system and its natural environment has had detrimental consequences" (p. xi). As societies recognised this fact they reacted. However, efforts to reduce impacts were technically oriented. And it was well known that "these efforts, which are of course necessary, [could not] be successful in approaching the aim" (ibid.). With time the definition of this aim changed, from "society must be in balance with its natural environment" to "sustainable development".

[10] cf. beginning of this section

3.2 Sustainability

Such a brief historical summary of environmental politics leads to the aim "sustainable development". This term "is now a key phrase heard on the lips of journalists, politicians, and academics" (Jones and Hollier 2002, p. xi). However, several authors suggest that the term "sustainable development" is ill-suited for goal-definition. In the German context the article "Effective Industrialism" [*Effektiver Industrialismus*] by Spehr (1997) is focused on the role of "sustainable development" within capitalism. Basically, according to Spehr, the role would enlarge the social and ecological impacts of that mode of production. On the other hand, Loske and Bleichwitz (1996) develop a German approach to "sustainable development". Their influential book "*Zukunftsfähiges Deutschland*" aims at solving the problems of our western society – at least as a long-term development – without questioning the basics of that societal form.

This diversity of approaches to the concept hints at the uncertainty in the discussions about the concept "sustainable development". Even if Werhane tries to approach the meaning of sustainability by looking at the literal meanings of "to sustain" (2000, p. 63), it does not become self-evident that "sustainable development" would be something intrinsic positive valued.[11] According to her, "to sustain" can be translated with "to keep a phenomenon in existence, to prolong existence, to maintain, nourish, or encourage a phenomenon, and/or to strengthen or improve it". This sounds appealing at the first glance, however, it needs to be asked what is sustained. Who does value the phenomena to be sustained? Schwertfisch, for example, points at structures and contents within the discourse of sustainability that are sustaining antifeminism (1997, pp. 154f.). Also the reference to German forestry of the 18th century[12] is not adequate to understand what the concept means today.

The debate between those who believe in "sustainable development" and those, who do not, is not restricted to Germany. For that reason an analysis of the discourse of "sus-

[11] Eblinghaus and Stickler (1996, pp. 37-57), however, extensively study the meaning of both terms, sustainability and development. For their study they use a linguistic-critical approach.

[12] cf. Bittencourth, Borner, and Heiser (2003, pp. 21f.): Trees should only be harvested to an amount that the forest can renew itself.

tainable development" seems appropriate.

Within the societal discourse "sustainable development", "sustainability", and the mostly used German translations "Nachhaltige Entwicklung" and "Nachhaltigkeit" are used to a large amount synonymously (Brand 2004 and Astleithner 2004, p. 2). Yet, some authors make distinctions between these terms (Tremmel 2004). However, for the aim of this paper, it would take too much resources for an analysis, which would try to take such distinctions into account – while even Brand (2004, p. 35) suggests that such distinctions are likely to be very subjective. Further, both Brand and Eblinghaus and Stickler (1996, p. 17) stress that the suggested distinctions between the scientific and the political discourse are artificial and would not reflect the fact that science is influenced by the wider societal and political discourse.[13] For these reasons, this paper will neither differentiate between the different words for the same meaning, and thus use "sustainable development" and "sustainability" synonymously, nor will the paper try to come up with a idealised "pure and neutral" scientific definition.

Seven years after the publication of the Brundlandt-report more than 70 definitions have been counted (Dingler 2003, p. 216).[14] One can try to classify them. Several approaches to sustainability exist: The hegemonic discourse as well as alternative approaches.[15] Often, the approaches are classified as "weak" or "strong" sustainability (Steurer 2001, pp. 540). Classification helps to have an overview on the definitions. However, even if Steurer (2001, p. 559) comes up with two to four paradigms, a suiting belief system has to be reasoned and chosen.

Since Steurer (2001, pp. 538) says that the relation of the so-called "growth discourse" and the sustainability discourse is usually not recognised, this analysis shall take into account this characteristic. The total analysis[16] can be separated in the following aspects

[13] cf. section 4.2, p. 50

[14] Steurer (2001, pp. 537) describes who has found how many definitions of sustainability.

[15] The word "hegemonic" is used in this text meaning predominant, leading and mainstream. Non-hegemonic approaches to sustainable development are discussed by Dingler (2003, pp. 342-383) and Carvalho (2001, p. 64).

[16] The analysis is very much based on the discourse analysis on "sustainable development", carried out by Dingler (2003) and Eblinghaus and Stickler (1996). The methodological basis of discourse analysis

of the discourse: First, the history of the concept of sustainability is discussed. Second, the hegemonic discourse on sustainable development, and third its criticism is introduced. Fourth, the discourse is briefly contextualised in the discourse of modernity, meaning the discussion is been looked at taking into account the framework of modern philosophical thought and assumptions. Based on these four elements, finally, a conclusion is given and the understanding of the concept in this paper is derived.

3.2.1 Historical Background of Sustainable Development[17]

The concept "sustainable development" has been shaped as a linked idea of developmental and environmental concerns (Eblinghaus and Stickler 1996, pp. 13, 24f.). This has already been the case the first time, when "sustainable development" has been used in an international policy paper (Dingler 2003, p. 215).[18] For that reason both aspects have to be dealt with. Whereas the historical environmental concerns have already been described above (section 3.1, p. 11), in the following the developmental discourse will be summarised.

3.2.1.1 The Development Issue

Based on the idea that societies transform, sociology already asked questions on development in its earliest stages (Hauck (1984) and Kößler (1991) cited by Eblinghaus and Stickler (1996, p. 19)). From the early sociological theories on development – superficially seen – more progressed theories were introduced.

To summarise, the two most influential approaches will be described: First, modernisation theory, and second dependency theories.

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has been summarised in section 2.3 (p. 8).

[17]Based on Eblinghaus and Stickler (1996, pp. 20-27)

[18]In 1980, UNEP, International Union for Conservation of Nature and Natural Resources, and World Wildlife Fund for Nature (WWF) published the "*World Conservation Strategy*". This strategy emphasised the ecological dimension, however, environmental sustainability was explicitly seen utilitarian for human needs.

Modernisation Theory First, the modernisation theory came up (1950's to 1960's). This theory took the western societies as the guiding principle for the so-called non-developed,[19] societies. It is contrasted between societies, that are characterised e.g. as rational and democratic and by economic growth, mass consumption, and individualism, called developed societies; and – traditional – non-developed societies, which are characterised e.g. by little development of sciences and their application in production, little industrialisation, hierarchical structures with little political participation, and a general low level of education. The reason for that under-development was seen as endogenic: cultural and mental factors were put forward as reasons.

However, the differences between the different traditional cultures were not taken into account. Therefore, all the "under-developed" societies were seen as one group. However, for modernisation theory it was important, that small sectors of capitalist, industrialised production existed in the societies, but too little developed for being able to change the overall development and structure of a society. These small sectors were supposed to develop the under-developed majority of the societies, such that the societies would be lead to highly industrialised western countries. Striving for the capitalist culture, a differentiated view on these western societies was nearly not included: Negative characteristics and developments within western cultures were faded out. Thus, the north-western culture was seen as positive, and modernised itself just by itself;[20] whereas the traditional under-developed countries are purely negatively characterised. For these one-sided valuations, the modernisation approach is seen as part of an ethnocentrist syndrom (Hauck (1992) cited by Eblinghaus and Stickler (1996, p. 21)).

Dependency Theories Because of criticism on the modernisation approach, dominantly, the developing countries were searching for more progressive theoretical approaches. There does not exist one dependency theory, but it is more a family of approaches, that all emphasised the exogenic causes of under-development. This family stems from theoretical considerations following the world economic crisis in the early 20^{th}

[19] politically correct they are called "less developed countries" (LDC)

[20] Thus, modernisation theory does not take into account the dependency of the north on the south for raw materials, that were organised for a long period by the colonial system.

century. The situation of the developing countries were analysed from the vantage point of a capitalist world-wide system. This analysis lead to the conclusion that the cause of under-development was mainly the long-term[21] dependency of the periphery-nations on the central (developed) nations of this world system: The countries of the periphery were restricted to the function to export raw materials as resources for production in the central nations. Furthermore, it has been hinted at the point that the external capitalist dependency-structures are reproduced in the societies, even after former colonies became independent.[22]

The solution to the problem of under-development from the dependency point of view was two-folded:

Minimising the impact of the capitalist world system :

Since the causes were supposed to be external of the under-developed country, it was taken-for-granted that the national society has to be secured from external influence. This could have been achieved by both: a rapid transformation of the world system and a rapid transformation of the national structures.

Internal development measures :

Independence should have come about by the development of an industrial sector, producing capital (goods), development and application of adapted technologies – leading to increased efficiency, and producing goods for mass-consumption for the basic needs. The Latin-American approach favoured very much the idea of Import Substitution Industrialisation (ISI).

Thus, dependency theories suggested basically the same measures as modernisation theory: "Development" was (and is) dominantly seen as striving for the guiding principle of westernised capitalist economy and way of life.

[21]Several hundreds of years within the capitalist world-wide system are said to have caused the ill consequences, which were then described as under-developed.

[22]The latter was reasoned with a structural dependency between capitalist and pre-capitalist sectors within societies: Both sectors would not, as the modernisation theory claims, exist parallel and independent from each other, but would be connected to each other in a large net of relations. These relations between capitalist and pre-capitalist sectors would then reproduce poverty and under-development.

After 10 to 20 years of struggle between both theoretic approaches and also other minor important developmental theories, they learned a lot from each other. However, none of them was able to explain the transformation of former third-world countries, such as the integration of the south-east Asian tiger states in the world-wide market. The struggle and the non-applicability lead to the crisis of the big developmental theories. Especially the common idea about industrial development furthered the crisis: Industrialisation goes together with nature-consumption, but the latter has been criticised in the world-wide resource discussion.[23] Therefore it had to be questioned even more the fordist, modern, industrial guiding principle. As a consequence the developmental discourse has been linked to the environmental discourse.[24]

3.2.1.2 Linked Discourses

The effect of linking both issues has been the greening of the modernisation and the dependency approaches:[25] Hence, ecological modernisation[26] has been described,[27] and the dependency theories' advocates emphasised pollution and ecological ballast, that the industrialised countries shifted to the developing countries.

The environmental discourse gained public attention, and therefore it became standard to argue global-ecological[28] rather than distribution-oriented.[29] Within this linked discourse it is complained about developing countries, that are often recognised as "pollution

[23] cf. section 3.1, p. 11

[24] cf. Haque (2000, pp. 3f.)

[25] cf. Carvalho (2001, p. 70)

[26] Ewen (2004, p. 114) or Rehbinder, Sukopp, Behrendt, Ewers, Hüttel, Jänicke, and Plaßmann (2000)

[27] Jänicke et al. (1999, pp. 142f.) describe e.g. the greening of international institutions, such as OECD, Worldbank, ASEAN, and NAFTA; and the greening of media.

[28] Jänicke et al. (1999, p. 143) describe the globalisation of environmental sciences, pointing at the International Council of Scientific Unions (ICSU), International Geosphere-Biosphere Programme (IGBP), World Climate Research Programme (WCRP), or International Human Dimensions of Global Change Programme (IHDP).

[29] The book "*Earth in Balance – Ecology and Human Spirit*" by Gore (1994) is a suitable example.

havens" allowing their industries an uncontrolled "race to the bottom" (Jänicke, Kunig, and Stitzel 1999, p. 137) instead of taking care for the structural reasons of the laws (ecological crisis).[30]

However, still in the year 2003 Bittencourth, Borner, and Heiser, p. 24 describe sustainable development as a developmental theory. The sustainability discourse also integrated the growth discourse, which was induced by "*Limits to Growth*" (Steurer 2001, pp. 539f.), as will be shown in the succeeding subsections on the hegemonic discourse on sustainable development and its criticism.

3.2.2 The Hegemonic Discourse and the Mainstream Addressing Sustainable Development[31]

The World Commission on Environment and Development (WCED: Brundtland[32] Commission report: "*Our Common Future*", 1987)[33] offered the very influential approach, that "is [now] broadly accepted politically and socially" (Scheelhaase 2000, p. 141): The broad definition of "sustainable development" means meeting both, the needs of current and future generations (Berkes and Folke 1998, p. 348),[34] it approaches the global problems by claiming preventive action, instead of only by end-of-pipe-politics (Eblinghaus and Stickler 1996, p. 59), and the report contributed the idea that growth and ecological sustainability would not conflict any more, based on the idea that the cause of environmental problems is not industry but poverty (Dingler 2003, pp. 221, 224). All further

[30]Many developing countries have laws including lower environmental standards compared to the German standards.

[31]based on Dingler (2003, pp. 220-250); the summary of Dingler's analysis can be found in Dingler (2003, pp. 257f.)

[32]named according to the name of the head of the international commission: Gro Harlem Brundtland (cf. Eblinghaus and Stickler (1996, p. 35)).

[33]WCED 1987, Oxford: Oxford University Press, cited by McDonach and Yaneske (2002, p. 217)

[34]The usual quote is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (WCED, 1987, p. 43, cited by Carvalho (2001, p. 62))

discussions focused on this WCED-report. Within the mainstream discourse, it has not been questioned since then, but perspectives on this report mutated[35] (ibid., cf. p. 257).

In consequence, the United Nations General Assembly called "for a global meeting that would devise strategies to halt and reverse the effects of environmental degradation 'in the context of increased national and international efforts to promote sustainable and environmentally sound development in all countries' " on 22^{nd} December 1989 (United Nations 2003a). The "*Agenda 21*" was the most important outcome of this global meeting[36].[37] On several hundred of pages the environmental and developmental situation is analysed and means are listed for the aim of sustainable developing societies (Böhm (1999, p. 10); Strobach (1997)). More than 170 nations agreed with this document[38] and by that the need of "fundamental examination of the relationship between the economy, society and the environment" (Giddings, Hopwood, and O'Brien 2002, p. 189) was confirmed. Even if this part of international "soft law" lacks a high committing status the moral claim to humanity is very high (Böhm 1999, p. 10). Further, *Agenda 21* mutated an important point of the WCED-report a bit: Now the causes of under-development and global ecological crisis are not only searched in the poverty of developing-countries, but in the production system of the north, too (Dingler 2003, p. 235). The problems of production were recognised in the economical production- and consumption-processes (ibid.). This supported the greening-approach described above (subsection 3.2.1, p. 19): Higher efficiency and modernisation is postulated globally (Dingler 2003, p. 239).

Having introduced to the discourse of the majority of governments on sustainable development, a more detailed analysis of the hegemonic approach, based on Dingler, shall be presented. Firstly, the causes of the global developmental and ecological crisis are

[35] Dingler uses the verb "to mutate" in order to express that minor changes occurred within the discourse – the structure of the discourse is slightly reconfigured. Yet, this does not imply that the whole discourse would change its direction.

[36] UN Conference on Environment and Development UNCED "Earth Summit" in Rio de Janeiro, Brazil 3-14 Jun. 1992

[37] cf. United Nations (2003b)

[38] Dingler (2003, p. 240) recognises this global consensus as hegemonic.

summarised. Secondly, the central solution "growth" and means to achieve and manage growth are discussed. This is followed by a brief introduction to further means that are found in the hegemonic solutions towards sustainable development. Eventually, this subsection closes with a summary of the hegemonic definition of sustainable development and provides a working approach for the discussion within this paper. Dingler bases his analysis mainly on three examples of the hegemonic discourse, namely *Our Common Future*, *Agenda 21*, and the World Bank approach.[39]

3.2.2.1 Causes of the Ecological Crisis

According to the hegemonic discourse, the ecological crisis is caused by three main problems[40], namely:

(1) in developing countries by poverty :

By emphasising poverty as the crucial cause, an analytical trick is made (Dingler 2003, p. 242): Poverty means too less development, and therefore – and this makes sustainable development more appealing to science and the wider public – the cause of the crisis is located in the developing countries. This implies no need to change in the north. Further, poverty could be overcome by economic growth: "An effective strategy for tackling the problems of poverty, development and environment simultaneously [... is ...] economic growth in developing countries that is both sustained and sustainable[,] and [is] direct action in eradicating poverty by strengthening employment and income-generating programmes" (Section 3.2 and 3.3 of *Agenda 21*, (United Nations 2004)).

(2) in developing countries by population growth :

It is argued that too many people live on a too small earth, with too less resources (Gore 1994, pp. 48f.). These people, who are too many, are risking to over-use the planet, they would create stress to the carrying capacity and destroy ecological

[39] cf. Dingler (2003, pp. 227-232)

[40] Dingler describes also mutations (reconfigurations) of the interpretation and construction of causes: 2003, pp. 252-254

systems.[41] This reasoning is not new. It stems from Thomas Malthus in 1798 (Eblinghaus and Stickler 1996, p. 89). Important for the hegemonic discourse is that population control would be possible, such that this problem is solvable. Gore (1994, pp. 309-320) even discusses population stabilisation as the first means for saving the world in "*Earth in Balance – Ecology and Human Spirit*". Synonymously to the first cause, population growth is a problem of the developing countries that is supposed to be eliminated by the means "population control".

(3) in industrialised countries by production and consumption :

Two different opinions exist on this cause. On the one hand, it is argued, that the specific way of growth is the cause, on the other hand the problem is located in a lack of ecological modernisation (inefficiency[42] and dissipation) (Dingler 2003, pp. 243): "The improvement of production systems through technologies and processes that utilise resources more efficiently and at the same time produce less wastes – achieving more with less – is an important pathway towards sustainability for business and industry." (Section 30.4 of *Agenda 21*, (United Nations 2004))[43]

3.2.2.2 Sustainable Growth

Growth is seen as the major means to approach sustainability (Dingler 2003, pp. 243f.). An excellent example for this are von Weizäcker, Lovins, and Lovins (1997, pp. 177-179), who believe in the possibility of overcoming the ecological crisis with economic growth. This believe becomes even more obvious in the book "*Die Wachstumsmachine*" by Lehner and Schmidt-Bleek (1999), who claim simply factor ten, instead of von Weizäcker et al.'s factor four,[44] and believe then that sustainable growth would go together with fun in

[41] cf. Dingler (2003, p. 242) and von Weizäcker, Lovins, and Lovins (1997)

[42] cf. von Weizäcker, Lovins, and Lovins (1997)

[43] cf. section 4.3 of *Agenda 21*; and cf. Seiki and Yamaguchi (1999, p. 124)

[44] von Weizäcker et al. (1997) argue that it is necessary that industry produces two times more efficient in order to allow the whole human population a way of consumption, which is acceptable to them (a factor two, for two times more consumption if the LDCs also start to consume more). Two times the factor two leads to the concept "factor four". Lehner and Schmidt-Bleek (1999) postulate that these

ecological lifestyle.[45]

However, it is not only for the industrialised countries that growth is postulated to solve the crisis, but for all societies. Herman Daly (1996) said that sustainable development is practically sustainable growth (cited by Dingler (2003, p. 243)). It is argued that the limits to growth are changed towards the new paradigm "to grow the limits". This process is to be achieved by innovation of technology and improvement of societal organisation. The recognition of limits in nature ("*Limits to growth*") is substituted by declaring that technology and societies are too less developed. And the limits of the latter developments are to be shifted away. Further, it is aimed at a new quality of growth, a rational managed growth. Thus, growth itself is not questioned, but the methods of growth management. New methods and regulations are claimed.

A fundamental key to sustainable development is the claim that there exists a so-called "trickle-down-effect". This effect shall transfer some of the large amount of gained welfare to the poorest of a society (Eblinghaus and Stickler 1996, p. 73).

In the following, the main methods, that are discussed to realise sustainable growth, are summarised.

(1) Efficiency :[46]

The first main method to further economic growth is to make every production process more efficient (Rogall 2000, p. 26). There is not much new to it: As Eblinghaus and Stickler pointed out, saving of resources should be the first task of managing a company. However, sustainability is also approached by reducing it to an energy- and resource-saving policy.[47] The efficiency revolution (Loske and Bleichwitz (1996, pp. 370-372), von Weizäcker et al. (1997), and Lehner and Schmidt-Bleek (1999))

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factors are too low, therefore the factor ten is calculated.

[45]The realisation of the rationalised sustainable consumption-discourse is discussed by i.e Hobson (2002).

[46]cf. Eblinghaus and Stickler (1996, pp. 75-77)

[47]cf. Scheelhaase (2000, p. 141); and Maxwell and van der Vorst (2003), who describe a "sustainability" production scheme, which tries to consider also environmental and social effects and determine the optimum sustainable way of providing a certain function (including the optimisation of impacts on "sustainability"), and overall a "win-win" situation is created.

does not see any competitors for approaching sustainable growth. However, this method is also characterised as a technocentristic approach (Dingler 2003, pp. 244-246) – implying a scientific expert culture – such that this method might not be applicable by non-experts. This approach does not claim any socio-economic transformations.

(2) Innovation of technology :[48]

Closely related to the efficiency paradigm is the strategy of innovation of technology. According to Dingler (2003, p. 246) this strategy represents the idea that new and better technologies would lead to less nature and energy consumption and to less waste. Therefore, Dingler calls this the hope in progress of technology on which sustainability is based. This strategy (that is not used exclusively to reach sustainability) focussed in the German case i.e. on giving research incentives for coal-mining, solar-energy, and biotechnology, what Hübner, Nill, and Rickert (2001, pp. 108f.) call greening of research- and technology policies. Gore, too, claims more funding of research in ecological sound technology (1994, pp. 309, 320-343). In his words, this sounds as if the new clean technologies would substitute the old-dated ones, and the whole world would benefit from these newly invented technologies.[49] Of course, non-renewable raw materials will be substituted by new equivalent raw materials in future – at least this is the task of technology (Dingler 2003, p. 246).

(3) Global environmental management :

A third important means to reach sustainable development is global environmental management. This strategy uses scientific information to measure world-wide consumption, production, and pollution in order to rationally calculate how resources should be used, where, and which pollution is environmentally sound. According to Jänicke et al. (1999, p. 143) ecological sustainable development points at problems that are not realised by people, but only by rational scientists.[50] In consequence,

[48] cf. Eblinghaus and Stickler (1996, pp. 78-80)

[49] However, Gore also claims that the relationship between humans and environment should be fundamentally rethought (1994, p. 321), and thus the new technology is supposed not to harm anyone.

[50] cf. Dimitrov (2003, p. 127)

science would need to act in certain precaution ways. This global control implies that global environmental management takes over the respective responsibilities of the national states (Dingler 2003, pp. 246f.). Management determines the carrying capacities for certain substances and then global environmental politics starts to allocate rights to pollute to the national states.[51] Compared to the fact that it needed 300 years to spread the parliamentarian system to many nations all over the world, the introduction of global environmental politics[52] that is believed to be based on natural scientific information (Dimitrov 2003, p. 123), was realised very fast (Jänicke, Kunig, and Stitzel 1999, p. 139).[53]

Dingler (2003, p. 247) points out four premises of global environmental management:

1. complete information,
2. knowledge about all (natural) "laws" and immanent dynamics,
3. the system has to be ruled by determinism, thus internal processes and the effects of external influences have to be calculable,
4. the system has to be scientifically analysable and manipulate.

The realisation of these premises are necessary in order to control the system. Altvater (1994) calls this a rational world control (cited by Dingler (2003, p. 247)). Compared to the efficiency strategy being based on scientific and technological progress, global environmental management is based on scientific and rational regulation and planning.

(4) De-coupling and dematerialisation :[54]

The fourth strategy is to increase growth by trading finance and services (not material products). Therefore the material production processes would not need to

[51] cf. Gore (1994, pp. 309, 361-366)

[52] e.g. the *Agenda 21*

[53] For the problems of global environmental politics cf. Eblinghaus and Stickler (1996, pp. 83-87) and e.g. Dimitrov (2003)

[54] cf. Lehner and Schmidt-Bleek (1999); the terms re- and de-coupling are discussed in detail by (van Eeten and Roe 2002, pp.13ff.)

grow (Dingler 2003, pp. 247f.). Still, such de-materialistic growth would increase welfare and the development level fast.[55] Making the desired growth independent of consuming nature[56] is also called de-coupling. Seiki and Yamaguchi (1999, p. 124) even claim that ecological sustainability is only possible by dematerialisation. Further, von Weizäcker et al. (1997, p. 324) suggest that people satisfy a lot more needs in a de-materialistic way.[57]

(5) Environmental economics :

The last means that is usually claimed in the hegemonic discourse to realise sustainable development, is to internalise social and ecological costs in private households and national welfare calculations.[58] This approach is said to be simple and effective, since the market-prices would foster that the "really" cheapest products and services are bought.[59] A well-known example of this means are eco-taxes (Eblinghaus and Stickler 1996, pp. 77f.) and tradable pollution permits (Rogall 2000, pp. 37-39). Further, the internalisation strategy is broadened to include nature itself into the market (Dingler 2003, pp. 389-399). Then, nature becomes capital.[60] From the economic point of view natural resources are commodificated. Except of the normative bad connotation, this leads to the conception of maximum sustainable yield (MSY) again.[61] However, it is assumed that with the necessary scientific knowledge the whole ecosystem could be expressed in economic terms such that the resources are

[55]Welfare can – according to Jänicke et al. (1999, p. 50) – be measured in terms of the GNP (gross national product).

[56](von Weizäcker 1999b, pp. 68, 105)

[57]cf. Grober (2002, pp. 5f.)

[58]cf. Gore (1994, p. 343-361)

[59]cf. Dingler (2003, p. 248)

[60]cf. Werhane (2000, p. 63)

[61]The MSY of any resource aims at using as much of a resource as possible, disregarding most factors except of the resource itself. The conception of MSY had already lost many advocates because neglecting some parameters was not seen as political correct (under the condition, that one wants all (or many) factors optimised and not only few).

seen in relation to other parts of the system.

3.2.2.3 Further Means to Support Sustainable Development

Besides following the strategy of sustaining growth, also other means are proposed. These, however, seem to be less important in the hegemonic discourse.[62]

The only exception of this, which does not relate to increased economic growth directly, is population control. Based on the interpretation, that the carrying capacity of the planet is nearly reached (Gore 1994, pp. 48f.), it is suggested to implement birth control,[63] and changes in health[64] and migration policies (Eblinghaus and Stickler 1996, p. 88).
Other means, such as a reform of education are usually not discussed in depth (Gore 1994, p. 309).

3.2.2.4 Hegemonic Definition of Sustainable Development

In general it is agreed to see sustainable development as a triangle (Eblinghaus and Stickler (1996, p. 52), Rogall (2000, pp. 22-29), and Dingler (2003, pp. 249f.)): "It is usually presented as the intersection between environment, society and economy, which are conceived of as separate although connected entities" (Giddings et al. 2002, p. 187) as can be seen in Figure 3.1 (p. 29).

In the mainstream discourse a need for intra- and intergenerational justice is broadly accepted (Bittencourth et al. 2003, p. 22). However, Dingler points out that there are two different paths described towards intragenerational justice. Both aim at sustained ecological prosperity in north and south. However, the paths towards justice are differentiated into distributive means on the one hand, and – liberally spoken – equal chances for everyone on the other hand (2003, p. 250).

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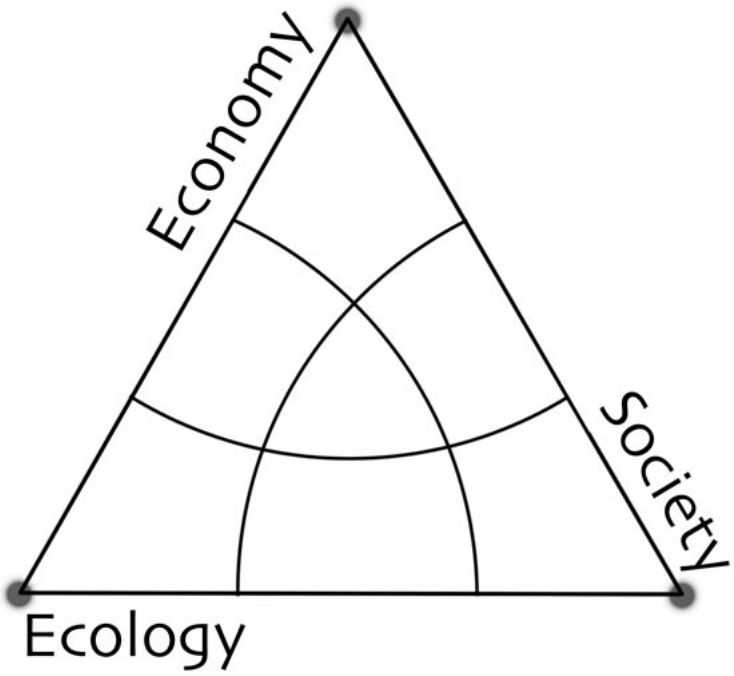
[62] cf. Dingler (2003) and Eblinghaus and Stickler (1996)

[63] e.g. long-term contraception or compulsory sterilisation

[64] e.g. no vaccinations for children that are very likely to die because of under-nutrition (Eblinghaus and Stickler 1996, p. 92)

Figure 3.1: Common three sector view on sustainability (according to Giddings, Hopwood, and O'Brien (2002, p. 189)). Development is supposed to take place "balanced" between the three extremes.



All means are based on rationality, science, technology, and management,[65] and aim at ecological sustainability (intergenerational justice).[66] At the same time, intragenerational justice is loosing importance continuously.[67] To summarise, the hegemonic discourse claims green reforms of the socio-economic structures, in order to realise a more efficient development. The efficiency strategy shall guarantee that the ecological basis for development is not risked. This implies that win/win situations are to be created, in which the production is greened and more profit is made (Kadritzke 2000). A societal transforma-

[65]This approach means: Since these means did not solve the problem yet, they have to be improved (Illich 1998, p. 25). For environmental management cf. Castellanet and Jordan (2002, p. 6).

[66]Dingler describes also mutations (reconfigurations) of the accentuation differences between different means and means-implementation strategies: 2003, pp. 256f.

[67]Dingler describes also mutations (reconfigurations) of the importance of the social aspects of the sustainability-triangle: 2003, pp. 255f.

tion is not discussed. The ecologically modernised western institutions are to be copied in the developing countries in order to realise the hegemonic sustainability approach (ibid., p. 241). Worldwide individuals are asked to satisfy their needs more de-materiastically.[68] Finally, the mainstream approach would provide "responsible prosperity for all" (Kofi Annan cited by Grober (2002, p. 5)). Of course this "all" does not include non-human beings or nature (Dingler 2003, p. 252) that have no intrinsic value in the anthropocentric hegemonic conception of sustainable development.[69]

3.2.3 Criticism on Sustainable Development[70]

It has been pointed out several times that sustainability is just a buzz word (van Eeten and Roe 2002, p. 20). O'Riordan et al. (1997, cited by Steurer (2001, p. 538)) articulate this more euphemistic, saying that nobody could oppose such a "metafix"-definition, which "covers the whole human endeavour and planetary survival". However, as shown above – even if the hegemonic discourse on sustainable development is not totally homogeneous[71] – the discourse is based on a consensus of fundamental ideas about the aims, means, and methods of sustainable development. When Kadritzke (2000, p. 8) laments that the aim of Sustainability is similarly flexible like the aim of the German Techno music mega-party "*Love Parade*", then it seems, he does not take into account the essential function of guiding principles, which is blurriness (Eblinghaus and Stickler 1996, pp. 38-41). The possibility to include a variety of ideologies in a container-concept is its essence.[72] Besides of this generalised criticism, that is often formulated similarly to van Eeten and Roe and Kadritzke, it is necessary to formulate and briefly analyse the substantial criticism on the hegemonic approach.

On the next pages nine conceptions, that are supposed to realise sustainable development,

[68] cf. Bittencourth et al. (2003)

[69] cf. Bittencourth et al. (2003, p. 23)

[70] Based on Dingler (2003, pp. 257-296)

[71] In fact, the discourse experiences heterogeneous positions and temporal discontinuities: Positions are mutated (reconfigured).

[72] cf. Eblinghaus and Stickler (1996, p. 115)

are discussed. Only after this it can be proceeded to the context of the concept and a working approach for this paper on sustainability.

3.2.3.1 Growth

Overall it can be said that eventually growth is the fundamental cause of over-using [*Übernutzung*] nature (Dingler 2003, p. 258).[73] Therefore, it is argued, the cause of the problem cannot not be at the same time its solution. Dingler, however uses a more abstract approach; he argues that unlimitable growth itself is not possible. Intra-economical limits could and extra-economical limits to growth do exist.

The intra-economical limits to growth refer to the the method of internalisation of the external costs.[74] This method, however, cannot be completly successful, since the complexity and the in-determinability of by-effects do not allow to calculate all marginal costs (including external costs) (Dingler 2003, p. 259).[75] Extra-economical limits to growth on the other hand are easily recognisable: Nature has limits, such as the surface of the planet, and therefore unlimited growth within limits is not possible. "As long as a conception of sustainable development, this is the conclusion, is based on the imperative of growth, sooner or later the limits to growth will be met." (translated by IL,[76] Dingler (2003, p. 260)) Growth is not totally separable (de-couple-able) from consuming nature: To produce two houses requires more resources than to produce one. However, the usage of a plane by many passengers compared to only view passengers may lead to less required resources for the transportation of each passenger. Yet, to construct a bigger plane for more passengers makes necessary absolutely more resources than providing a service for less passengers. Both growths happen still with the paradigm "The economy produces goods and goods are good so more goods must be better." (Princen 2001, p. 12) The

[73] cf. Carvalho (2001, pp. 70f.), Haque (2000, pp. 12f.), Borghesi and Vercelli (2003)

[74] cf. (5) Environmental economics, p. 27

[75] An example can be the difficulty of internalising the risk of nuclear power stations. Zweifel and Umbricht (1999) showed for Switzerland that the largest amount of risk is not internalised, although this was the aim of prior decision-making.

[76] IL=Ingmar Lippert

subsequent problem shall be further explained in the next subsection. Yet, under this assumption, it follows: The fact that ecological systems have limits in providing resources and take-up capacities leads to the fundamental insight that nature has limits to take up human emissions, too. For these reasons a sustained growth cannot exist. Hence a conception of sustainable development claiming sustained growth is paradox in its aims. Daly (1996) concludes "*sustainable growth is impossible*" (cited by Dingler (2003, p. 262)). This criticism of growth, of course is not restricted to capitalist economies, but also to existing and the former socialist economies (Dingler 2003, footnote 74, p. 263).

3.2.3.2 Efficiency, De-coupling, and Dematerialisation[77]

As has been already pointed out above,[78] an increase in efficiency is essential for capitalist firms. Any company that does not increase its efficiency, would eventually not continue to exist. Increasing efficiency decreases the production costs of the company. This means, that an increase in efficiency is rather an economic mechanism than an ecological one. Increasing the efficiency is part of the economical rationality, and the latter lead to the over-use of natural resources (Dingler 2003, p. 265). Therefore efficiency increases the ecological crisis and does not heal it.[79] Since efficiency has to be permanently present, this strategy alone cannot be successful.

However, of course an increase in efficiency can reduce the urge to change, since the same amount of resources can be used for a longer time.[80] Yet, this is only true, if the total

[77] cf. Steurer (2001, p. 549)

[78] (1) efficiency, p. 24

[79] cf. Grober (2002, p. 5)

[80] Some argue that efficiency would be increased due to more knowledge&technological progress, more input of labour and capital in the production process. As is shown later, capital without a material base can economically be considered as inflation. In times of inflation the capital is usually re-valued in the financial markets. Therefore, growth of efficiency based on pure increase of capital input is not independent from consumption of material, thus nature. Also the strategy of increasing the input of labour force requires material input. Usually all kind of workers need tools and a complex infrastructure. Both depend on a natural base, too. Fortunately, the hope in "scientific&technological progress" cannot be contradicted so easily. Still, the scientific and material development of new technologies – and the

amount of consumption[81] stays the same. The latter assumption is not true usually: What is won due to an increase in efficiency is often given away by growth of produced units.[82] In general the rate of an increase in efficiency would need to be much higher than the suggested factors of four (von Weizäcker, Lovins, and Lovins 1997) and ten (Lehner and Schmidt-Bleek 1999).[83] Sarkar (1999) calculated a factor of 27 in order to keep up with the assumption of 50 years decrease in consumption in industrialised countries and enjoying economic growth of two percent per year (cited by Dingler (2003, p. 267)). Sooner or later, the marginal gain of an increase in efficiency would meet the marginal costs of itself.

The idea of dematerialisation of an economy does not take into account that a large amount of such dematerialised goods and services are based on material premises: Traffic or military services, for example, presuppose a large amount of material infrastructure. Also, if dematerialised economy would take place, the gained capital would be used to increase production in general (as capital is circulating) (Dingler 2003, p. 268). Also, in a rational economy services are always at risk to be technically substituted, which implies a rematerialisation. Further, and very important, a society based on dematerialisation needs a highly developed communication infrastructure. Information and communication is based on a material basis. Therefore, strategies that are supposed to transfer the dematerialisation "myth" to developing countries, do not answer how these countries should "jump" to the stage of a highly developed infrastructure, without following the paths of the industrialised countries. The latter paths, however, are said to be not sustainable. Hence, dematerialisation, being based on a large amount of material premises, is not sustainable: It necessitates more material consumption, instead of decreasing the use of nature. Finally, a sole virtual increase in value would not provide the basis to buy anything material (ibid., p. 269). Such an increase of value is called inflation.

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conditions for using them – may demand more resources than used before.

[81] cf. Hildebrandt (1990)

[82] cf. Bachmann (2002, p. 9), Eblinghaus and Stickler (1996, p. 158)

[83] cf. footnote 44, p. 23

3.2.3.3 Environmental Management

In the following paragraphs the premises of environmental management (EM)[84] shall be criticised: Dealing with nature rationally is based on the epistemological assumptions of modernity.[85] These assumptions have been criticised often,[86] and by some philosophers they are even considered to be in a crisis.

Also it will not be possible to collect all data and information about a specific ecosystem.[87] Therefore, only incomplete management of nature is possible. Furthermore, even if all information and data could be provided, chaos-theory questiones the determinability of complex systems: Non-linear systems are immanently characterised by unpredictability and thus cannot be managed based on informed decisions (Dingler 2003, p. 271).[88] Even if management tries to take place, predictions can always be counter-acted by the instability/inadequacy of the known system. Thus, a strategy towards sustainable development based only on EM is likely to fail. Even if probabilistic approaches are used, environmental management cannot provide guarantees for the total control of the environment. Because of the social dimension of environmental issues, Cairns (2003) argues that environmental management should not be based sole on quantification, but on ethical decision making. Still, the strategy of EM can be used for a better use of resources, and for experiments influencing nature.

3.2.3.4 Poverty and Population Growth

Poverty can cause an over-using of nature. However, to explain the existing global environmental crisis, poverty does not help. To a large amount (Loske and Bleichwitz say

[84] cf. (3) Global environment management, p. 25

[85] cf. Dingler (2003, pp. 58-75), or more briefly Gray (2004, pp. 16f.), and Morrow and Brown (1994, pp. 42-49)

[86] cf. e.g. Ramazanoğlu and Holland (2004, pp. 46-49), Dingler (2003, pp. 301-303), Solomon (2001), or Morrow and Brown (1994, pp. 42-49)

[87] cf. Cairns (2003)

[88] cf. van Eeten and Roe (2002, pp. 89-92), Castellanet and Jordan (2002, p. 23), Williams (2002, pp. 200-202)

about 80 percent) over-using nature is caused by the industrialised countries (Loske and Bleichwitz 1996, p. 267). Rather the lifestyle of the people of these countries, than the poverty of the people of developing countries is responsible for the environmental crisis (Dingler 2003, p. 273).

Similarly, population growth can increase the over-using of nature. Yet, the lifestyle of the poorest does not worse the environmental crisis so much. A larger significant influence has the lifestyle of the people of industrialised countries. Even if population growth is an important problem – analytically – it has to separated from the environmental crisis. The quantitative growth of consumption of the north,[89] and not the population growth in the south causes the problem (ibid., p. 274). Definitely, if all poor people lived the same way as the people from the industrialised countries do, then this would increase the crisis detrimental. Yet, the current situation is caused by the lifestyles within the industrialised countries. Therefore, the lifestyle has to be criticised at first place.

Dingler classifies both arguments, poverty and population growth would cause the environmental crisis, as a pragmatic trick to be able to stay with the imperative of economic growth and to be able to look for the problems at another place, but not those at home (2003, p. 276).[90]

3.2.3.5 The Concept "Needs"

Needs play a central role in the discourse (Carvalho 2001, p. 63), however, to get to know the needs of future generations is not possible. Even Maslow's hierarchy of needs does not allow to predict all the concrete needs of persons (Gleitman, Friedlund, and Reisberg 2000, pp. 614-616). Individuals are diverse; they are members of different societies and shaped by their social and physical environment that also change within time and space. To get to know the needs requires asking the very individuals. Since they do not exist, they cannot formulate them. Thus, to evaluate them, it is necessary to assume certain values, to imply our needs for these future generations. This presupposes the premises of temporal and trans-cultural continuity (Dingler 2003, p. 277). Both premises assume

[89] cf. Haque (2000, pp. 13f.)

[90] cf. Carvalho (2001, p. 63)

an essentalistic concept of "needs": The needs would be part of the nature [*Wesen*] of human beings. This idea is deconstructed by Dingler and he comes to the conclusion that needs are historically, socially, and culturally shaped; they are constructed in discourses that take place in the context of power-relations.

The hegemonic definition of sustainable developments "future needs"[91] is ethnocentristic and thus useless for a global strategy, which should sustain also cultural diversity.[92]

If future generations should have the same options as we have today, we would need to stop any interventions in nature, stop being immediately (ibid., p. 280). The idea of substitution of non-renewable resources, for example, is based on a certain idea of the function of the resource within our historically, socially, and culturally shaped context. Future generations might want to use the resource totally differently.

These reasons show that sustainable development is not appropriate to fulfil the idealistic demands if defined based on the idea of "needs" or "options". Instead normative discussion is needed about in how far it is acceptable in our – historically, socially, and culturally shaped – context to cut options for future generations.

3.2.3.6 Ruling and Production

Both, Dingler and Eblinghaus and Stickler, point out that the hegemonic approach asks for reforming the societal structures in order to implement ecological modernisation. Yet, the current mode of ruling is neither analysed nor questioned (Haque 2000, pp. 15f.). Systematically, the crisis is seen as a problem caused by inefficiency, management and not enough modernity (Dingler 2003, p. 281). However, Spehr (1997) locates the cause for over-using nature in the ruling relations [*Herrschaftsverhältnisse*]. In order to analyse and understand the environmental crisis it would be necessary to include power-relations into the analysis.

Even, it is suggested to put through the political consequences of scientific reasoning in

[91] cf. footnote 34, p. 20

[92] cf. Dingler (2003, p. 278)

other countries (Würtenberger, Binder, and Köllner 2004).[93] Eblinghaus and Stickler (1996, p. 82) call this a neo-colonial approach.

Any strategies used for the sake of sustainable development, put effects on people differently. Some experience advantages, others are discriminated.[94] Therefore, as long as certain concepts of sustainable development presuppose existing hegemonic institutions, these approaches to sustainability should certainly be questioned.[95]

Further, the mode of production is systematically not questioned within the hegemonic discourse. On the contrary, it is tried to commodificate nature, such that it fits to capitalism: Werhane (2000, p. 63), for example, says that "a number of environmentalists argue that we need to conserve and nurture the ecosystem through activities such as [...] maintaining the present 'captital' [... by e.g.] protecting biodiverse species[96]". It is even

[93]This refers e.g. to claims that other (esp. LCDs) countries "have to" protect certain eco-systems, change ways of production, or implement certain patterns of trade (postulated for economic globalisation). However, Dimitrov (2003, p. 126) hints at the point "science cannot dictate policy since politics intervenes between knowledge and action, and the transition from information to interest formation is shaped by values, power, and institutions".

[94]cf. Schwertfisch (1997, pp. 154f.)

[95]cf. Dingler (2003, p. 293)

[96]The biodiversity discourse is a good example for discussing sustainable development and capitalism (cf. Eblinghaus and Stickler (1996, pp. 80-83)) E.g. partly within developmental programs, bioprospecting projects are carried out. These bioprospecting projects have the aim to "explore and investigate biodiversity for the purpose of finding commercially valuable genetic and biochemical resources and subsequently patenting them" (Degaldo 2002, p. 299). Aubertin, Boisvert, and Vivien confirm the tendency so see biodiversity basically as genetic diversity (1999, p. 7). Such bioprospecting projects also appear "as part of oil and mining prospecting and ecological conservation and cultural-medicinal recovery projects, etc." (Degaldo 2002, p. 317).

These bioprospecting projects e.g. "depend on the knowledge of rural and indigenous communities that have established an intimate relationship with nature since precapitalist times" (ibid., p. 299). Yet, firms and their protective nations are interested in utilising this knowledge. In order to realise their capitalist motives, they promote "biopatents, granting [multinational corporations] and other actors in Nation states (universities, institutes, etc.) exclusive ownership over genes, plants, animals and human genetic material, which they have isolated, purified, modified and manipulated for the first time" (ibid., p. 305). Using biopatents genetic diversity becomes exploitable and privatised. Thus, market logic and rationality

argued that development may be unsustainable. "There are two reasons [for this]: one is a politically unsustainable polarisation in incomes. The other reason is environmental degradation." (Raffer and Singer 2001, p. 27) The first reason clearly hints at criticism on capitalism. Besides these internal effects of capitalist structures, it is also argued that "sustainability standards" are used by industrialised countries to protect their own markets from goods of developing countries. In case of environmental standards, this is called eco-protectionism.[97] Finally, a fundamental problem has to be stated again: It is known that capitalism experiences a crisis, but it is tried to modernise capitalism with its own elements (efficiency) (Eblinghaus and Stickler 1996, p. 158). This is contradictory, but not discussed in the hegemonic discourse.

3.2.3.7 Divergence between Ecological and Economical Developments[98]

The economic subsystem is striven to be independent of the ecological subsystem. In terms of economical processes, resources are transported and processed very fast; in terms of ecological processes, these resources are changed slowly. For markets distances are rather easily bridged, but in ecosystems transport is more difficulty. Economy tries to a large amount to unify singularities, to make them tradable, whereas ecology depends on diversity. Dingler comes from these and more oppositions to the conclusion, that the orders of both subsystems cannot fit together and therefore will produce instabilities (2003, pp. 293-295).

3.2.3.8 Participation[99]

Agenda 21 recognises the need to strengthen major groups: "[M]oving towards real social partnership in support of common efforts for sustainable development" (Section 23.4 of *Agenda 21*, (United Nations 2004)). However, Strobach points out that the participation

prevails over ethics and the idea of heritage (Aubertin, Boisvert, and Vivien (1999, p. 7) and Timmerman (1998)): Biopatents serve "the purposes of powerful private interests" (McAfee 2003, p. 216).

[97] cf. Raffer and Singer (2001, pp. 186-232)

[98] cf. Grober (2002, p. 4)

[99] cf. Eblinghaus and Stickler (1996, pp. 85-87)

of these major groups is claimed to be somehow diverse: Companies are more equal in participation than most other groups (1997, pp. 20-22).[100] This can be explained based on Abels and Bora (2004, pp. 15-33): Participation is a political means of inclusion. It can be used in different ways: Some people or stakeholders are included, and others not. Some are *de facto* stakeholders, some "just" *de jure* (van Eeten and Roe 2002, p. 31). Usually participation is supposed to increase the legitimacy of a decision(-making process), only then solutions to problems "have some chance of success" (Castellanet and Jordan 2002, p. 12). To increase this legitimacy, Castellanet and Jordan say, participation is necessary.[101] From a democracy-theoretic point of view, participation of special groups is controversial (Abels and Bora 2004, pp. 19-33). Still, participation is necessary, but should be based on an improved discourse framework, one that seeks empowerment of the actors (Williams 2002, p. 204).

3.2.3.9 Scientification and Technocentrism[102]

Scientification, and its implication technology, have been named as causes of the environmental and developmental crisis.[103] Even Gore (1994, p. 322) hints that it would be a myth that technology is "good" all the time.

According to Bateman and Zeithaml (1993, p. 595): "technology is the commercialisation of science", but including science into the framework of markets implies that science experiences the limitations of markets. Local and traditional knowledge of the peripheral countries is often not recognised and accepted by the dominating mainstream philosophy of science. However, within the hegemonic discourse it is claimed, that this mainstream science shall provide the solutions to the crisis: The efficiency-paradigm and the management-approch are characterised by their scientification.

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[100] van Eeten and Roe (2002, pp. 27-31) put this problem into the rhetorical question "Are all stakes equal?" (p. 31) It is considered that often the "experts" themselves are important stakeholders.

[101] Castellanet and Jordan address solution-finding for environmental problems and the role of participation.

[102] Based on Eblinghaus and Stickler (1996, pp. 158-160)

[103] cf. Bittencourth, Borner, and Heiser (2003, p. 24)

In 3.2.3.3 (Environmental Management, p. 34) it has been shown that total control of nature is not possible; environmental management cannot prevent the over-use of nature. And some, who try to approach management, notice that efforts to manage the human impacts on the environment continue to be ill balanced. Still, Sikdar and Jain do emphasise that "the one-dimensional approach of applying technology to solving environmental problems has obvious limitations" (2002).[104] Science cannot carry out all the relevant valuations neutrally and isolated,[105] but values have to be discussed with all affected humans or even beings.[106]

This subsection (3.2.3.1-9) has pointed out that there is fundamental and serious criticism on all, the definition, the cause analysis, and the means of sustainable development as suggested in the hegemonic discourse. Between different items of the package sustainability inconsistencies [*Inkosistenzen*] are recognised. Also premises of the hegemonic approach are to be seen (at least) as problematic.

Therefore it can doubted that the mainstream approach to sustainable development is more than a temporarily improvement of the way humans use-up the nature (Dingler 2003, p. 296): "A significant shift in attitudes and actions upon which the realisation of a sustainable development process depends" (Carvalho 2001, p. 70) cannot be found.

3.2.4 Contextualisation of Sustainable Development

The hegemonic discourse of sustainable development takes place within a modern world. In modernity the aim to emancipate humans from nature by science exists (Dingler (2003, p. 41) and Marx and Engels (1981, pp. 9-11)). Emancipation does not take only place virtually, but also practically by controlling nature (Dingler 2003, p. 42).[107] This relation

[104] cf. Warren and Larson (2000, p. 192)

[105] cf. chapter 4 (p. 47)

[106] In subsection 3.2.5 (p. 43) it is briefly described how to approach such a discussion theoretically.

[107] Dingler (2003, p. 483) also comes to the conclusion that the ecological crisis is already been predetermined within the concepts and discourses of modernity. The concept "nature", for example, is used such that nature is being controlled by mankind.

between human beings and nature is called anthropocentrism. The mainstream approach to the relation of humans to nature is that the constructed materialistic world of man is different from the natural world.[108] And, it is this anthropocentric vantage point, Werhane (2000, pp. 63f.) reports that is questioned by a minority of environmentalists: Deviation [*Abweichung*] from the pure anthropocentric perspective is postulated.

The cause for the sustainability discourse is the environmental and developmental theory crisis. However, today, it is no more publicly discussed that "the whole human species" (Davoll 1978, p. 3) could be extinct, due to human-induced environmental change on this planet that is already dominated by humans (Lüdeke, Petschel-Held, and Schellnhuber 2004). Societies, even, seem to persist in applying prior scientific-technological solutions to environmental problems. This goes together with a society that is dominated by status-concurrence, output-competition [*Leistungswettbewerb*] and bureaucratisation. The costs of such societies are considered too high in relation to technological potential and societal wealth (Habermas (1969, pp. 182f.), cf. McWilliams and Piotrowski (2001, p. 1)). The assumptions of modernity should be questioned (Haque 2000, pp. 16f.).

After the end of the cold war the opportunity came up to sustain capitalism.[109] The hegemonic discourse of sustainable development seems to be part of this process (Weigel 1997, p. 29): nature is seen as a resource to be exploited, and an utilitarian perspective is taken (Werhane 2000, p. 64).

3.2.5 Conclusion of the Analysis and Working Approach of "Sustainable Development"[110]

In this last subsection on sustainability, the main conclusion of the preceding chapter is presented as well as described how sustainability will be understood in the following parts of the paper.

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[108] cf. Jones and Hollier (2002, p. xi)

[109] cf. Birkin (2001), who writes about "natural capitalism".

[110] Based upon the preceding sections, and Dingler (2003, pp. 483-494) as well as Eblinghaus and Stickler (1996).

It is not enough to agree superficially on the Brundtland definition, if this definition implies such huge problems. The hegemonic approach can be seen as a starting element for discussion. However, only through detailed and fundamental criticism it is possible to get to know the problems of this approach. As a guiding principle not the Brundtland definition should be taken, but to question the Brundtland definition, to comprehense the historical development of the concept "sustainable development", to critically examine *Agenda 21* and other follow-up documents.

From such a brief analysis, which is a bit critical, five points have to be emphasised: First, modernity is reproduced through sustainability in the hegemonic sense. Second, the epistemological question, how to deal with future needs, has to be addressed. Third, rationality, technology, and management as solutions to the ecological crisis are reflected. Fourth, the issue of resources is briefly touched, and from this point the social aspect of the ecological crisis is pointed out. Finally the concept and the analysis of sustainable development is reflected as taking place in a political context.

The hegemonic discourse of sustainable development is characterised by the hope to renew modernity that finds itself in a crisis, with the means of modernity: This is called ecological modernisation. By that, the institutions of modernity are reproduced. Yet, those institutions are very much the cause of the existing crisis. Science[111] is one of theses institutions, besides governments, the capitalistic mode of production, and others. Also management is part of theses institutions that are seen as both, cause as well as remedy. The modern hegemonic approach to sustainable development could therefore worsen the problems, which it is supposed to solve. For this paradox situation a critical approach towards sustainability is needed.

To a large amount it is consensus that sustainability should contain both, inter- and intragenerational justice. The idea of justice is based on rights and needs. However, it has been shown that it is not that easy to cope with the epistemological problems of

[111] including neo-classical economy

the concept "sustainability": The intergenerational approach of sustainable development should be appreciated, even though we cannot know what future needs exist, or how needs can be evaluated.[112] Further, we cannot know how the effects of today's actions are valued one generation later. Thus, we cannot know whether an object, and our dealing with the object, has the attribute sustainable in the sense that future generations would appreciate our decision to sustain or destroy[113] the object.

What can be done now, is to go into a valuation-process and decide – taking into account all the values, norms, arguments – how to deal with a certain object or situation. Thus, a sustainable process would need to be open, such that all affected people can participate in decision-making within the process. However, the definition of "openess" depends also on our specific culturally, politically, and historically shaped context. For such an open valuation- and decision-making process the societal constraints should be taken into consideration. The theory of speech-acts and discourse ethics of Habermas therefore could be helpful to prepare and reflect upon such processes (1991a, 1991b).[114]

The conclusion is that we should accept that we cannot know what is sustainable from the point of view of the future, but what we can rather do is to include all people who feel affected or appropriate to participate in decision-making. In order to provide the chance to recognise whether someone is or could be affected or somehow be interested in a decision, it is necessary to reveal the known present and potential conflicts and problem dimensions of the decision.

The discourse frame for such a decision-making process, has to be as open as possible, such that the social reproduction of values and predetermined (modern) approaches is minimised. A sustainability discourse would try to get to know qualitatively new approaches. This presupposes that the occurrence and induction of such new approaches has to be engendered and not prevented. Yet, necessarily social reproduction cannot be stopped during a discourse, but it should be kept in mind that it exists and has the ten-

[112]What is just depends on the societal context, too, L'udovít Hajduk (2004, p. 437) points out.

[113]Basically, we cannot know whether future generations would appreciate our way of dealing with the object, whatever we do with it.

[114]cf. the problems of Hajduk (2004) mentioned in footnote 54 (p. 86)

dency to prevent the maturation of radical new approaches.

Measures for "sustainability" should take into account all forms of knowledge, create an atmosphere for an fundamentally open discourse, give the possibility to participate as individuals, but also enhance critical discussion within other groups.

The central points of this aspects towards sustainable development are therefore participation and ethics.

The hegemonic discourse presents the causes of the ecological crisis as a problem that primarily could be solved by rationality, technology, and management. However, the analysis leads to the conclusion, that the ecological crisis is far too complex, just to explain it only within such a narrow frame. This does not imply, that the rationality, technology, and management approach in itself would be wrong; maybe this approach is helpful. However, as most criticism on sustainability shows, the ecological crisis has to be seen to a large amount as a problem of the relations between society, ruling, and nature. As has been pointed out above, the modern societal institutions are producing the ecological crisis structurally: Within the modern society, the aim of controlling nature exits, leading to anthropocentrism and to concepts of science, emancipation, and freedom: a hierarchy in which humans rule nature. Therefore, to solve the ecological crisis, it should be dealt with it primarily as a societal and ruling problem.

Overall, the ecological crisis has to be seen from a multidimensional perspective. This includes at least three aspects: the rationality, technology, and management approach; the economic view; as well as the relations between society, ruling, and nature. Since all these aspects are structurally part of the discourse of modernity that is culturally, politically, and historically shaped, and has thus material effects on all the named institutions, this leads to the conclusion, that the overall problem should be seen as a problem of the discourse of modernity. Within this discourse the situation is analysed, referring to nature. However, nature cannot be seen as a pure reality[115] outside of the discourse, but the analysis is carried out in a politically shaped field. It is a question of power, and not of technology and rationalism, to analyse the ecological crisis after all.

[115] cf. section 5.1, p. 55

Since sustainable development tries to analyse and solve the ecological crisis, the concept is politically, and thus socially constructed. If the concept is socially constructed referring not to a real nature, but reconstructs nature within the discourse, different approaches to nature and sustainability can be constructed. Hence, it is plausible to have several concepts of sustainability. All these concepts have to take into account that they are not alone, and there exist reasons to question them.

If a working ecosystem is necessary for human beings, they should deal with nature such that the limits of carrying capacity of the ecosystem are not met. Renewable resources need to regenerate and emissions should not be more created than can be absorbed within the respective ecosystem. However, the definition of carrying capacity implies in what kind of nature society is willing to live. Thus, it is again very much dependent on the relations of society to nature.

The limits to growth, which exist materially (at least from our point of view), limit the amount to which nature can be transformed to capital without meeting the limits of the carrying capacity. Therefore, eventually, a non-growth society has to be accepted: A steady state economy.

Since the ecological crisis meets different social groups in a variety of ways and some more and some less, the ecological crisis induces also a social question. Therefore, decision-making always meets the problems of justice.

This working approach cannot give a concrete, and especially no pure-neutral-positivistic-scientific, definition of sustainable development. Still, what can be provided are the five points, summarised above, as basic items to be considered in sustainability discourses. Of course, the conclusion leading to these points is socially, politically, and historically influenced. Therefore, they should be subject of debate.

Finally, it can be concluded, that sustainable development is constructed in a way that it reflects how society wants to live in nature, about the expectations of society for the future, and the societal idea of justice. The construction is taking place in the presence of power. Thus, the concept “sustainable development” needs to be reflected politically

when using it.

Chapter 4

Science and Society

Within the course of study *ERM* it is often said, "sustainable development" would the aim that we[1] are striving for. At the same time this statement takes place within a so-called "scientific" environment. Therefore, when dealing with *ERM*, first, it is essential to examine whether this is a science or whether it can become one. Second, it is decisive to study the consequences of speaking about *ERM* as a science. Depending on these consequences, scientific action in *ERM* should be organised. For that goal, general characteristics of sciences shall be discussed in this chapter. Furthermore, to prepare for the framework of *ERM* as a science, a brief introduction about interdisciplinarity follows.

Within this paper, for time reasons, it is not possible to comprehend the predominant discourse of science studies. Therefore Kuhn (1970) has been chosen as a starting point for the discussion of science. In the following, the most important points of his description of sciences shall be introduced. This summary is based on a more detailed analysis.[2] Besides this Kuhn-based approach, it is tried to take into consideration that criticisms on Kuhn's approach exist.[3]

[1] with "we" I refer to the *ERM* community consisting of both, students and professors.

[2] A summary of this text can be found at `www.erm.tu-cottbus.de/~lippein/studies/2004/kuhn1.pdf`

[3] cf. e.g. Lakatos (1995), and Solomon (2001)

4.1 Constitution of a Science

"We tend to see as science any field in which progress is marked" (Kuhn 1970, p. 162). This statement can be clarified. If several competing schools exist in the field, each of them sole can progress. Nevertheless, as long as each school constantly questions the others' foundations, the outer world considers the field as a whole as not progressing. "It is only during periods of normal science[4] that progress seems both obvious and assured" (ibid., p. 163). The image becomes clearer if it is considered that a scientist of a single school needs only to justify herself towards a small and united community, whereas if all schools worked according to the same paradigm they had to justify their works towards a much larger audience: Popperians "hold that controversy is vital not for some practical reason, but because it will stimulate severe testing and the refutation of false hypotheses" (Martin 1985, p. 40). Still, this audience consists only of scientists. This contrasts to the fields of engineers or doctors: They justify their choice of problems in terms of societal importance. Therefore, their audience is the society as a whole. This favours long-lasting public debates between different schools. However, this can just quantitatively explain the speed of progress. Kuhn examines some further factors that influence the speed of progress. Finally, analysing the history of sciences one major criterion to constitute a science can be found: Working according to a fully matured "paradigm" can be viewed as science (Kuhn 1970, pp. 178f.).[5]

The important role of paradigms is "to guide the whole group's research" (ibid., p. 22). According to Kuhn "except with the advantage of hindsight, it is hard to find another criterion that so clearly proclaims a field a science" (ibid.). This guide is so important because it unites all the researchers dealing with the subject under one fundamental work. Examples are e.g. Aristotele's *Physica*, Newton's *Principia* and Lyell's *Geology*. These works have two characteristics in common. First, they were "sufficiently open-ended to leave all sorts of problems for the [...] practitioners to resolve" (ibid., p. 10) and at the same time defined "the legitimate problems and methods of a research field" (ibid.). Second, "their achievement was sufficiently unprecedented to attract an enduring group of

[4] cf. this subsection (p. 49)

[5] For discussion about further concepts of science cf. Lakatos (1995) and Solomon (2001)

adherents away from competing modes of scientific activity" (ibid.). Following the same paradigm the researcher commit themselves "to the same rules and standards for scientific practice" (ibid., p. 11). However, "to be accepted as a paradigm, a theory must seem better than its competitors, but it need not, and in fact never does, explain all the facts with which it can be confronted" (ibid., pp. 17f.). Thus, if a group of scientist agreed on a paradigm, they can start the usual scientists' business that is called "normal-science".[6] But, this business can never explain all problems; it has inherent restrictions due to the paradigms choice for legitimate problems, methods, and theories. Hence, working in normal-science consists only of puzzle-solving (ibid., p. 36). That is, to strive working on a problem and finding out the anticipated according to the guiding theory.[7] Like in a puzzle, a scientist puts together the necessary parts that she can grip using the paradigms' methods. The set of the pieces is given by the paradigm.

Typically "the formation of specialised journals,[8] the foundation of specialists' societies, and the claim for a special place in the curriculum have [...] been associated with a group's first reception of a single paradigm" (ibid., p. 19). With these instruments the group can communicate the findings of their daily practicing of normal-science.

In a different way, "fields like medicine, technology, and law [are considered as sciences, because their ...] principal *raison d'être* is an external societal need" (ibid.) for "objective, progressed, and comprehensible" services. Still, the advantage of working with a paradigm is kept. That is, not to need longer start each work "from the first principles and [justify] the use of each concept introduced. That can be left to the writers of textbooks" (ibid., pp. 19f.).

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[6] Martin notices that not necessarily all scientists work according to the same standards. He says, "the pseudoscientist or group of pseudoscientists isolate themselves from the mainstream of scientific practice and from critical interaction with the scientific community. The attitude of the pseudoscientist is dogmatic and slightly paranoid; he is intolerant of all theories expect his own" (1985, pp. 40f.). Cf. Lakatos (1995, pp. 1-7).

[7] If such a theory cannot explain what it is supposed to be able to explain, the field experiences a crisis. In this case, the paradigms assumptions are usually critically reflected by some, but not all scientists. The latter stay with the "old" paradigm, whereas others might come up with a improved paradigm.

[8] cf. Bird (2002, p. 24)

Eventually, a "disciplinary matrix" can describe the "relative fullness of professional communication". Its most important elements are: First, "symbolic generalisations" as "expressions, deployed without question or dissent by group members" (ibid., p. 182). Second, "metaphysical paradigms" as "shared commitments to such beliefs as: heat is kinetic energy of the constituent parts of bodies" (ibid., p. 184). Third, "values" as usually shared by several scientific communities. E.g. "deep held values concern predictions: they should be accurate; quantitative predictions are preferable to qualitative ones" (ibid. p. 185); or concerning theories: they should be simple. It shall be emphasised that different scientist can apply these shared values in a variety of ways.

Having discussed the emergence of a new science, it shall be shifted to the societal consequences, better: to the necessary interaction between science and society.

4.2 Society and Science

Obviously, "research is not performed in a social vacuum. There are many benefits but it is not without some ethical concerns" (McCuen (1996, p. 17), cf. Spier (2002)). Spoken abstract, this is not a difficult clue. However, again and again scientists postulate through their behaviour that scientists could work independently of other parts of the society.

For several reasons independence is not possible. First, the objects of sciences usually are shaped by the society. Ecosystems as an object, for example, are discussed by van Eeten and Roe (2002, p. 24): An ecosystem is influenced by humans. Therefore, it is historically determined, and it is subject of political, social, and cultural discourses. They argue that scientific action ought to take this complexity into account (van Eeten and Roe 2002, pp. 89-92).

Second, scientific groups themselves are definitely part of the society. They are culturally shaped. Helpful for the respective analysis can be anthropology of science (Franklin (1995, p. 163), cf. Castellanet and Jordan (2002, pp. 32f.)). This scientific community understands science as a culture[9] and therefore provides necessary tools for such an anal-

[9]E.g.: "Ecologists, engineers, and other professionals [...] see the goal in very different conceptual and practical terms. Each profession has its own culture." (van Eeten and Roe 2002, pp. 5f.). Therefore

ysis. Anthropology of science can be used as a means to rethink the scope and potential of future studies (ibid., p. 164). It shall be noted that critiques exist on the "leftist", who are called subversive to "transparency and neutrality of objective[10] inquiry" (ibid., p. 164). This can be easily explained: As Franklin states:

> "From an anthropological vantage point, the fact that the attempt to question a foundational belief system such as science makes its practitioners threatened is not difficult to understand. The sense of threat precisely indexes the importance of science as a source of cultural values that are deeply felt. Science is defended so vehemently because it is cultural, not because it is extracultural" (ibid., p. 165; cf. Morrow and Brown (1994, p. 63), Dingler (2003, pp. 28-30, 33f.)).

Of course, such science studies are part of a global shift that questions western scientific establishments.

Third, as shown by Kuhn (1970), Franklin (1995), and Spier (2002), sciences consist of values[11]. Usually, "certain cultural values are equally invisible within both sciences studies and within in sciences itself" (Franklin 1995, p. 166). Most important for the western culture: Value-neutrality and transparency are equally cultural values. The distinguishing "between pure and applied knowledge, hard and soft sciences invokes not only this value system, but the hierarchical nature of it" (ibid., p. 166; cf. p. 172). Moreover, Hume largely discussed the importance of the invisibility of values and the influence of passions. He shows that "abstract or demonstrative reasoning [...] never influences any of our actions, but only as it directs our judgement concerning causes and effects" (Hume 1909, p. 194). Thus, "the impulse [of action] arises not from reason, but is only directed by it" (ibid.). Hume says, reason "ought only to be the slave of the passions" (ibid., p. 195) what deeply indicates a further example for values. For him it was important to point out, that "reason is perfectly inert, and can never either prevent or produce any action or affection" (ibid., p. 235). An additional example for the value-loadedness of sciences

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van Eeten and Roe researched into the cultures of "line operators, ecologists, engineers, species-specific regulators, modelers, and scientists" (ibid., pp. 169-216)

[10] E.g. Adam (2003) discusses in depth the idea of "objectivity".

[11] What values are, and where they come from, could be subject of further analysis. E.g. Czeżowski (2000, pp. 187-189) discusses this topic.

can be recognised within science education: "The purpose of the curriculum is to change people and to move people in desirable directions" (Mayhew and Ford 1972, p. 168).[12] According to Mayhew and Ford setting up a curriculum implies "looking at the expressed needs of [the] clients and the expressed and implied needs of society, [determining] what sorts of people society wants and needs" (ibid.).

Fourth, scientists as individuals within a capitalist society are interested in making money and not loosing their jobs. Therefore,

> "planners and forecasters will tend to produce plans that please their clients, whether governments of private industry, or perhaps their clients will only employ and support forecasters who can be relied upon not to say anything very disturbing. Thus, forecasts prepared for governments tend to be bland, to avoid 'political' issues, and to convey a discreet impression that whatever happens will be capable of resolution by civil service. If anything further is needed, the market mechanism will be relied on, in spite of evidence that it is currently failing to solve problems far less severe than those anticipated" (Davoll 1978, p. 13).

These entangled interdependences, in the end, lead to the highly political character of sciences.

Thus, finally, sciences are political. A major interest of sciences is to be autonomous. However, "the autonomy of science cannot be kept unpolitical. It calls for the reflection of unavoidable social dependencies by the groups involved in the process of teaching and researching" (translated by EC:[13] (Habermas 1969, p. 203)).[14] Additionally, Habermas says that the autonomy of science calls for the discussion of "social tasks of science being aware of the political responsibility for the effects and by-effects" (ibid.).[15] If it is assumed

[12] cf. also to (Martin 1985, pp. 140ff.)

[13] EC=Elke Christoph

[14] "Die Autonomie der Wissenschaft kann nicht unpolitisch gewahrt bleiben. Sie verlangt, dass die am Lehr- und Forschungsprozess unmittelbar beteiligten Gruppen die unvermeidlichen gesellschaftlichen Abhängigkeiten reflektieren und die gesellschaftlichen Funktionen der Wissenschaft im Bewusstsein politischer Verantwortung für Folgen und Nebenfolgen erörtern."

[15] For example, it needs to be considered which choice of methodology is likely to enhance, which kind of societal reproduction. This is due to the act of choosing a methodology being politically (cf. Morrow and Brown (1994, pp. 200f.).

that the "ideal" of a science is to be critical, then this critical science creates enlightening knowledge [*Aufklärungswissen*] that can induce practical consequences (Habermas 1969, p. 246). Mai (2004) for instance emphasises the political responsibility for consequences in the realm of technology. Furthermore, to create enlightening, scientific discussion[16] is necessary. And, "the basis of enlightening is science bound to the principle of authority free discussion and only bound to this principle" (translated by EC: Habermas (1969, p. 245)).[17] Yet, the actors of science are of course influenced by power and interests,[18] which are in the dimension of politics (Dimitrov 2003, p. 127). Overall it can be said, that science makes societal processes more scientific and at the same time is part of society. Through these factual processes a political dimension of science is presupposed (Habermas 1969, pp. 249-258).

These five reasons lead to

> "the insight, that science has to rely on being unmodern to a certain degree [... This understanding requires strict functionality: Science] has to concentrate on the sparse and abstract argument, that the sciences [...] applied at universities have to keep a certain tension towards society, if [societies'] conditions should not enchain the critical powers" (translated by EC: (Habermas 1969, p. 60)).[19]

4.3 Interdisciplinarity

Environmental and resource management as at least overlapping with the environmental management sciences "must be a subset of interdisciplinary research. The challenge

[16] The conditions of "discussion" need to be analysed, too. Czeżowski (2000, pp. 60ff.), but also Habermas (1991b) writes on this topic. cf. subsection 5.5.2 (p. 101)

[17] "Die Basis der Aufklärung ist eine an das Prinzip herrschaftsfreier Diskussion, und allein an dieses Prinzip, gebundene Wissenschaft."

[18] "Influenced" does not mean, that scientists would produce only information that is looked for by the powerful actors (cf. Dimitrov (2003, p. 143)).

[19] "Die Einsicht, dass Wissenschaft einer gewissen Unzeitgemäßheit institutionell sich versichern muss, bedarf strenger Nüchternheit. Sie hat sich auf das karge, jeden romantischen Schleiers bare und dabei einigermaßen abstrakte Argument zu beschränken, dass gegenwärtig die auf die Universitäten etablierten Wissenschaften zur Gesellschaft sich in Spannung halten müssen, sollen nicht deren Verhältnisse die kritischen Kräfte ganz in Fesseln schlagen." (Habermas 1969, p. 60)

concerned in this context is to increase the knowledge of the relationship between social, economic and technical subsets" (Ittelson and Burkhardt 1978, p. xi). The question arises what exactly is meant by the concept "interdisciplinary". One could guess that everyone can use the concept for everything what one wants to say.

On an OECD-seminar on interdisciplinarity in France (1970) it was found: "The 'interdiscipline' of today is the 'discipline' of tomorrow. Indeed, the breakdown of knowledge into a hierarchy of disciplines itself reflects social values" (Apostel, Berger, Briggs, and Michaud 1972, p. 9; cf. p. 73). This nicely shows again the entangledness with society. An university itself usually is not interdisciplinary. It "may be pluridisciplinary (i.e. collecting various disciplines) and offer either courses in a single discipline, or pluridisciplinary courses (teaching diverse disciplines), or interdisciplinary courses (courses showing the relationships among various disciplines)" (Duguet 1972, p. 12). With that a first definition for interdisciplinarity is offered. Duguet develops three points that should be met in order to create an interdisciplinary link "between teaching and research:

1. the courses offered must prepare students for interdisciplinary research by giving them an adequate methodology;
2. research work in turn must provide the teaching programs with the tools and concepts required to constitute an interdisciplinary methodology;
3. the result is that [...] training at every level of schooling should stress interdisciplinarity in order to make it easier for the future [professionals] to develop new attitudes and to enable them to encourage them in others" (1972, pp. 14f., emphasis deleted).

Thus, there seems to exist agreement on the aim and presuppositions of interdisciplinarity. However, the term can still be used in different ways. Heckhausen (1972) proposes six different types of interdisciplinarity that he classifies according to their stage of maturity [OECD: CERI/HE/CP/70.05].

Returning to environmental sciences, Bittencourth et al. (2003, p. 27) suggest that interdisciplinarity is used to work on problems, which are defined not by a sole discipline, but by several. It would be worth it to summarise such interdisciplinary approaches to environmental problems as e.g. those by MIT – The Social Learning Group that stresses the importance of interdisciplinary research (2001, p. 191). Unfortunately, the topic deserves far more space than can be provided here.

Chapter 5

Developing a Framework of *ERM* as a Science

These remarks permit us, at last, to apply some conceptions of sciences on *ERM*. Yet, the subject matter of *ERM* has not been defined. It is now time to notice that the term "*ERM*" had entered this paper only as a name of the special course of study at BTU Cottbus. In this chapter, five critical characteristics of sciences will be used in order to develop a *framework* in which the course of study *ERM* can be seen as *scientific*: First, the subject matter of "ERM" will be worked out. Since this is not sufficient to add up to a framework, second and third, the goal-orientation of the field and resulting responsibilities for the practisers are discussed. Finally, fourth and fifth, methodological questions and characteristics of scientific discussion are approached. Practical consequences of such a framework will be postponed for discussion in chapter 7.

Before paying attention to the subject matter of ERM, the demands of scientific definitions in general shall be examined.

5.1 Definitions

In this section I shall ask what are the different kinds of definitions, and which kind of definition is to be expected in defining ERM.

For this aim Martin with his philosophical analysis of science education can be used again

(1985). He says,

> "for our purposes, a definition will be considered a statement explicitly specifying that one word or expression (the word or expression to be defined) means the same thing as some other word or expression (the word or expression used to define the word or phrase to be defined). For example:
>
> 1. 'Conversation system' means 'a system of particles in which the forces on any particle of the system are forces which can be derived from a potential energy function.'
> 2. 'x is magnetic' means 'if a small piece of iron were placed near x, then the piece of iron would move toward x.'
>
> These are typical cases of definitions, as we shall understand the term. For convenience we shall refer to the word or expression to be defined as the *definiendum* and the word or expression to define the definiendum as the *definiens*" (Martin 1985, p. 76).[1]

Perhaps the most striking feature of a definition which has just been encountered is that one expression can be rewritten *meaningfully* in other words. Being provided with this option, this paper seeks to explicitly express the definiendum *ERM* by some other terms.

"Expressing" refers to a human activity, the defining activity. That is important because humans tend to use language differently. A definiendum can be explained by different procedures. One can distinguish ostensive teaching of words and teaching words contextually. The first procedure consists of pointing at the definiendum and uttering the definiendum. The latter procedure uses words for both the definiendum and the definiens. For instance: "When something is magnetic and a small piece of iron is placed near it, the iron is pulled toward the magnetic object" (ibid., p. 77). This type of definition (the same for both procedures) is called *reportive*. Reportive definitions reflect the actual usage of the definiendum.

However, the last quote could be transformed to: "When something is magnetic and a small piece of iron is placed near it, the iron explodes." What is different? The important change is that someone who says the latter one probably does

[1] A critical discussion of that can be found in Dingler (2003, pp. 26-28).

> "not intend his definition to reflect language habits at all. He may rather be stipulating a meaning. His definition then is tantamount to an announcement of how he proposes to use a particular expression in his lecture or paper, regardless of how it is used normally by scientists, if it is used at all. Within this paper such definitions are called *stipulative definitions*. Stipulative definitions are neither correct nor incorrect, since they are proposals to use an expression in a certain way" (ibid.).

There exist definitions, which cannot be classified into the schema of reportive versus stipulative. For example, "a person may intend that his definition make[s] a vague and imprecise term less vague and imprecise" (ibid., p. 78). Martin calls such a "definition that purports to reduce the vagueness of the ordinary meaning of a term an *explication*" (1985). Explication, as it aims at improving reportive definitions for a scientific purpose, is one type of *rational reconstruction*. Other types of definitions may not intend to improve the scientific usage of a definition. Hence, they are not classified as a rational reconstruction.

This overview on classifications permits to shift to the meaning of a definition. It needs to be understood that defining one word is different than defining a whole expression. In the first cases one can easily start with the defining procedure. In the second cases it is needed to choose which concepts of the expression are relevant. Yet, this does not help how to explain the meaning of the definiendum. Kuhn suggests (by referring to Wittgenstein) the following for the notion of concepts and their relation to objects (Kuhn 1970): For instance, "we apply the term 'game' because what we are seeing bears a close 'family resemblance' to a number of activities that we have previously learned to call by that name" (ibid., p. 45). This holds true also for paradigms: The various research problems, corresponding methods, and techniques similarly "relate by resemblance and by modelling to one or another part of the scientific corpus which the community in question already recognises as among its established achievements" (ibid., pp. 45f.). Thus, scientists usually intuitively know how to apply a word and what problem or method is legitimate.
However, if this intuition does not grant a common outcome when several persons are asked, one needs to analyse the expression more closely. This method has been criticised in literature; nevertheless, a more successful method has not been found in the context

of this paper. For such an *analytic definition*, it has to be examined which words determine the sense of the expression. This is called finding, which words are *semantically relevant*. "First, it might not be clear in a standard use of a term whether a property was semantically relevant [...]. In an analytical rational reconstruction this problem could be settled, for example, by specifying only those properties which were clearly semantically relevant, or by making a decision to include those properties which were unclear [...] in the class of semantically relevant properties – a decision which would be made on the basis of the usefulness of the resulting rational reconstruction to scientific theory and practise" (Martin 1985, p. 82).

Situation within *ERM* One simple argument to show that a definition of *ERM* is needed[2] is the following. Still, assuming the premise that *ERM* shall be scientific. It has been pointed out that science is very much based on critical discussion within a community. Since it is very difficult to constructively criticise a theory which includes concepts, that are continuously imprecise (Tremmel 2004, p. 26), these concepts have to be defined cleary.

Further, within the learning process it can be of advantage to be able to use an overall theoretical frame which provides direction to understand where to place the more basic or small objects of knowledge. This claim for a frame can be satisfied with a definition of the concept *ERM*.

The current status of a definition of *ERM* is not adequate. Therefore a stipulative rational reconstruction of this concept shall be developed.

[2] What currently happens while studying *ERM* at BTU is that students learn to define ERM by family resemblance. Several concepts are provided within the learning environment, which are somehow related to each other. However, first, this relation can often not be critically reflected, since no time is provided for this, and second, the choice of concepts to be taught and learned is an unreasonable narrow choice: Some concepts are included, others not. Focusing on the choice, the difference between those concepts and conceptions being taught and those presented in chapter 3 (p. 11) is worth being recognised. Thus, the large network of terms and the name of the network (*ERM*), which are taught does not satisfy. Furthermore, it seems to be necessary to delimitate the network name from such names as "Sustainable Environmental Management" (Goldstein 2002) and "Integrated Environmental Management" (Margerum 1999).

5.2 Subject Matter

This section provides a six-step line of reasoning: First, two elements, which explain the societal needs in management towards sustainability, are worked out. Second, a literature review is used to confirm the importance of both elements. Third, rather concrete questions, which environmental management has to deal with, are introduced. Forth, this leads back to a basic underlying problem, that EM encounters. Fifth, a vital social activity, called "ERM", is decribed based on the societal needs and the problems which were encountered. Straight forward, sixth, this guides to a "Framework of contextual definitions of ERM". Finally this section closes summing up in terms of "disciplinarity".

5.2.1 Societal Needs in Management Towards Sustainability

In chapter 3 a claim for management towards sustainability has been found. This claim can be seen as a principal *raison d'être* for an activity, which aims at elaborated management towards sustainability. This external societal need has been expressed since the 1970s, recently for instance in the *Agenda 21* (1992), and

> "ten years later, [at] the World Summit on Sustainable Development (WSSD) [which] took place in Johannesburg [...] 2002. [...] This summit has drawn the world's attention towards difficult challenges we are faced with: the improvement of people's life and the conservation of natural resources. These two factors mentioned above are related to the population growth, which has an increasing effect on the demands for food, water and other basic needs" (Eisert et al. 2003, p. 14).

However it has also been shown that the management approach is subject to criticism.[3] Since this need for an elaborated management is expressed, too little has been improved: During the last 30 years too little has changed in order to prevent fundamental human-made changes to our environment. Kolb (2003) points out that it is simply not enough if governmental rhetoric copies the statements of environmental conscious activists or scientists. A huge gap exists between the consciousness, knowledge, and potential to act environmentally sound on the one hand and societal action on the other hand (Kolb (2003), Linneweber and Kals (1999)). Even if managers' textbooks recognise that "En-

[3] cf. subsection 3.2.3, p. 30

vironmentally conscious strategies can be cost effective" (Bateman and Zeithaml 1993, p. 193) "there is little evidence to suggest that firms have adopted a strategy of social responsibility for their own sake, particularly in the area of environmental impact" (Smith 1991)[4].

Since the claim for management towards "sustainable development" exists, it has to be clarified how *ERM* can be used for this aim. For this clarification, the approach to sustainability – put forward in subsection 3.2.5 – is appropriate. Even if sustainability "[means] all things to all people" (Redclift and Woodgate 1997, p. 4)[5], a working definition for BTU is needed. This paper proposes an approach – and this one has to be subject of debate. Still, this approach to sustainability shall be used in working out the subject matter.

In order to work out the subject matter, it is suggesting to itself to recognise how traditional "pure" management (approaches to sustainability) can be criticised. Unfortunately, there was no time to discuss "pure" management dealing with both, social as well as with environmental issues. However, since it will be worked out that the latter approach is not satisfactory, more elaborated approaches to management have to be searched for. Consequently, environmental management approaches and their relation to sustainability will be classified. This step guides to the fundamental problems to be recognised by management, and in the succeeding subsection to abstracting the management's approaches of the past towards a new focus of management studies towards sustainability.

5.2.1.1 "Pure" Management Approaches

"Pure" managers already try to meet the – as some say: challenging – problems in order to achieve environmental soundness. They are realising: "Preventing pollution offers far more benefits than does eliminating it after the fact" (Bateman and Zeithaml 1993, p. 190). That is why they accept as "a new and urgent imperative: to create a new relationship between business activity and our natural environment that will halt environmental

[4]Smith, D. 1991: The Kraken wakes – the political dynamics of the hazardous waste issue, *Industrial Crisis Quarterly*, 5(3), pp. 189–207.; cited by Bichta (2003, p. 14)

[5]referring to Wolfgang Sachs (Wuppertal Institute)

damage and clean up the effects of past practices" (ibid., p. 191). The aim became "win-win situation with customers and other environmental stakeholders" (Brown and Karagozoglu 1998, p. 12). Staying with the imperative, Bateman and Zeithaml state in their management textbook for their respective scholars that all types of "managerial decision should address [environment]" (1993, p. 192). However, when Bateman and Zeithaml give examples of how which fields of the firm affect the environment, their perspective becomes firm-centred[6]: For instance, "even finance and accounting are affected, because federal regulation requires companies ..." (ibid.) to meet some regulations. Two points have to be emphasised. First, *environmental problems affect the firm.* This directed link raises questions: Especially it can be asked, why management does not point out that their *firms affect the environment*, too. The second point being similar: not that the firm affects environment, but because the firm is being passive, the *government is the actor, who affects the firm.* Hence, in both cases the firm is affected passively. Moreover, with *"even finance..." being affected by the government*, the environment is totally peripheral. However, there exists a mixed impression: Bateman and Zeithaml explain to management students that "facts argue against all these reactions" – those reactions, which (1) deny environmental problems at all, (2) say engineers will fix all problems and (3) defeat managers' responsibility.

To learn more, an example of one approach of "pure management" shall be discussed in more detail: Why should any institution change its behaviour? Managers approach this question by examining the competitive, technological and economic environment, but not the natural environment (Bateman and Zeithaml 1993, pp. 620-626). Nevertheless, they provide a framework how to deal with resistance against change within their institutions (ibid., pp. 633f.).[7] Reasons for resistance are:

- Inertia (people just do not want to change their way of doing it)
- Timing (it is never the right time to change)

[6]This is not surprising, since having a firm-centred perspective is what managers are paid for.

[7]cf. Krücken (2002), who discusses change within universities and also addresses how – without changing – environmental tasks are integrated in universities (p. 21).

- Surprise
- Peer pressure
- Self-interest "Most people care less about the organisation's best interest than they do about their own best interests. They will resist a change if they think it will cause them to lose something of value." (ibid.)
- Misunderstanding (people do not fully understand)
- Different assessments (different people know a situation differently)

Based on these reasons, they were able to develop criteria in order to educate the management scholar: According to Bateman and Zeithaml change is possible

> "when
>
> 1. The organisation is moved from its current state to some planned future state that will exist after the change.
> 2. The functioning of the organisation in the future state meets expectation [...].
> 3. The transition is accomplished without excessive costs to the organisation.
> 4. The transition is accomplished without excessive costs to the individual organisational members." (1993, p. 634)

Taking into account these criteria, it seems more comprehensible why managers of firms tend to resist any change based on environmental reasons. Environmental reasoning is characterised by an unknown future state, which is due to the complex environmental interrelations. Furthermore, any change seeking sustainability is perceived by meeting not the private, but the public interests (even though sometimes private and public interest might overlap). Of course, this constitutes costs to the organisation as well as to its members. Still, business world is also perceived as having accepted the idea of EM (Brown and Karagozoglu 1998, p. 18).

Returning to the aim to manage towards sustainability, the question of change seems to be addressable by management studies.

It has already been pointed out that within the discourse of sustainability the management approach has been criticised itself. Furthermore, fundamental criticism exists on the idea that management would solve the problem of growth.[8] The approach of Critical Theory to management goes even further and points out the influences and responsibilities of managers in the social and political context (Alvesson and Willmot 1992b).

5.2.1.2 Classification of Paradigms of Management of the Environment and Resources

Jänicke, Kunig, and Stitzel (1999, p. 15) define management as:

> a group of techniques, which are of help to control [*steuern*] complex systems, such as states or enterprises, in order to realise their aims. The conservation of the natural environment would be a management task, too. EM is delimitated from command and control-instruments for the realisation of its aims. (paraphrased translation by IL)

This definition is an example of one mainstream approach towards managing the environment. Of course, a diversity of approaches exist; scientific reactions to the environmental crisis cover a wide spectrum: Merely within the field of environmental management, Colby (1991) finds five differing fundamental paradigms. These shall be introduced here, even at the risk of oversimplification. Since Colby pays special regards to EM, to frame the discussion his approach seems quite appropriate.

Before introducing the paradigms themselves, it is necessary to see how Colby uses the concept paradigm. He observed in 1991,

> "societies are now beginning to have serious discussions about 'sustainable development'. [...] Conceptions of what is economically and technologically practical, ecologically necessary, and politically feasible are rapidly shifting. [...] Five fundamental paradigms of environmental management [can be] described. From the primordial dichotomy of 'frontier economics' versus 'deep ecology', paradigms of 'environmental protection', 'resource management', and 'eco-development' are evolving, in a progression which involves increasing integration of economic, ecological, and social systems into the definition of development and the organisation of human societies. Each perceives different evidence, imperatives, and problems, and prescribes different solutions, strategies, technologies, roles for economic sectors, culture, governments, and

[8] cf. e.g. Illich (1998, pp. 11-12, 25), and van Eeten and Roe (2002, p. 15)

> ethics, etc. Each actually encompasses several schools of thought, not always in complete agreement, and there are also areas of overlap" (ibid., p. 193).

These five paradigms implicate "differing philosophies of human-nature relationships" (ibid.).

Thus, one extreme is the "frontier economics" approach, the other one being "deep ecology". In between, for example, the technical approach of environmental protectionists are found: "Engineers respond to the needs of society with technical innovations" (Liu, Lipták, and Bouis 1997, p. xv), and see themselves in a "privileged and challenging position, because their tools are the totally of man's knowledge, and their target is nothing less than human survival through making man's peace with nature" (ibid.).[9] On the contrary, deep ecology aims at finding the balance between humans and nature and answering how humans should live (Deval 1985; Harding 2003)[10]. Thus, between these two extremes a broad spectrum of scientific fields can be found. The historical and dimensional development of the paradigms towards environmental management can be presented as follows (see figure Figure 5.1, p. 65): "Frontier economics" "treats nature as an infinite supply of physical resources [...] to be used for human benefit" (Colby 1991, p. 195). This paradigm is the oldest one. As a reaction[11] "deep ecology" emerged, which has been described above. Following and mediating between them, three more progressed approaches were developed. "Environmental protection" appeared after the book *Silent Spring* (1962)[12] was published. Most important, environmental protection is damage control, "what might be called the 'negative, or defensive agenda'" (Colby 1991, p. 200). It is also called end-of-pipe technology, because the problems are not prevented, but dealt with after the production process has finished (Eblinghaus and Stickler 1996, p. 98). Resulting from its problems "resource management" and "eco-development" came up. The

[9] Of course, also engineers exist, who have a more critical attitude towards their profession. Cf. e.g. Gorman, Mehalik, and Werhane (2000), van Eeten and Roe (2002), Hodgson and Perdan (2002).

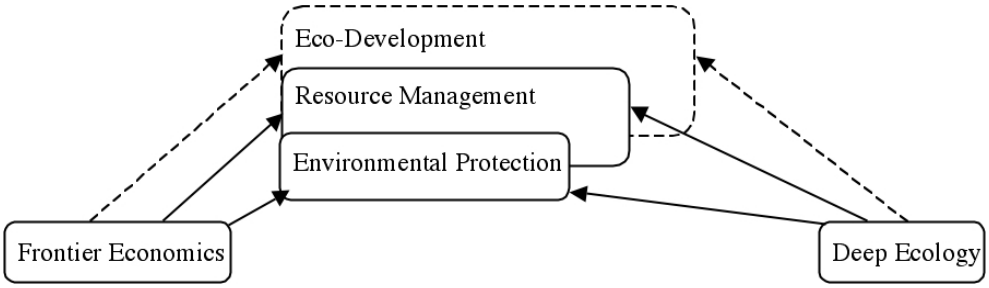
[10] The Gaia-conception is important to understand this approach. Cf. e.g. Crutzen, Luhmann, and Smrekar (2002), Franck (2002).

[11] "Deep ecology" as part of the ecocentrist paradigm is influenced by the thought of romantic transcendentalism of the 19^{th} century (Jones and Hollier 2002, p. 8).

[12] cf. footnote 6, p. 12

first deals with everything as resources, striving for "global efficiency" (Sachs 1988)[13]; whereas eco-development "sets out to restructure the relationship between society and nature into a 'positive sum game' by reorganising human activities so as to be synergetic with ecosystem processes and services" (Colby 1991, p. 204).

Figure 5.1: Evolution of EM-paradigms (according to Colby (1991, p. 195)). The figure uses three dimensions: First, in the vertical scale the time is indicated (bottom: past, top: future). Second, in the horizontal scale the three mediating paradigms are positioned between both extremes. And third, the non-solid lines indicate the current development towards future approaches.



Years after the Colby's classification, the discussion about the paradigms continues. Also, another overall classification of management strategies towards sustainability has been given by Eblinghaus and Stickler (1996, pp. 99-110) and Jones and Hollier (2002, pp. 2-10). They differentiate between two technocentrist paradigms (cornucopian and accommodating technocentrism) and two eco-centrist paradigms (communalist ecocentrism and deep ecology). From studying their classification, it can be seen, that Colby's classification should not be interpreted as if "frontier economics" and "deep ecology" would no longer exist. The "extremes" certainly continuously influence the management discourse. In order to make the competition between the paradigms more comprehensible, some advocating voices shall be introduced: E.g. Berkes and Folke (1998) study the young history of resource management, Sikdar and Jain (2002) place the task of EM under the aim

[13]Sachs, W. 1988: The gospel of global efficiency: on worldwatch and other reports on the state of the world, IFDA Dossier, 68, pp. 33-39, cited by Colby (1991, p. 204)

of sustainability, which is in the context of Steurer (2001), who discusses sustainability-management rules, Ricci et al. (2003) discuss uncertainty, whereas Grima et al. (2003) and Reller (2004) postulate new approaches to the mode of production.

In the field of resource management,

> "science developed under the conventional reductionistic and mechanistic world-view and, further, it was shaped by the utilitarian premises of the early industrial era. Nature was viewed merely as a storehouse of raw materials; resources were thought to be valuable to the extent that they could be used to create wealth" (Berkes and Folke 1998, p. 345).

Their findings can be summed up by saying, "that resource management is necessary but that it requires fundamental different approaches, not mere tinkering with current models and practices" (ibid., p. 2). They integrate two main streams, different from classic utilitarian approach, in their work: First, a systems approach including adaptive management is being used. This implies not to consider resources "as discrete entities in isolation from the rest of the ecosystem and the social system" (ibid.). And second, they elaborate the thought "that improving the performance of natural resource systems requires an emphasis on institutions and property rights" (ibid.). In this framework Berkes and Folke stress the importance of a social science of resource management.

Toll (1999) agrees with this importance and stresses the inherently inseparability of "scientific and socio-economic dimensions of environmental problems. [...] Understanding this inseparability is the foundation of successful environmental problem-solving, and a prerequisite to the effective use of formal decision-making tools."

In the decade after the UNCED, the importance on sustainability was stressed again and again. So, Sikdar and Jain (2002) state, that "sustainability should be the guiding light for managing the environment now and in the future." Their analysis finds the need to apply, beyond natural science[14] and technology, "tools [of] the realms of ecology, economics, sociology and policy" (ibid.) in order to solve environmental problems. They also agree

[14] A brief discussion of the terms "natural science" [*Naturwissenschaften*] versus "human", "social", "cultural" or "moral" sciences [*Geisteswissenschaften*] can be found in Morrow and Brown (1994, p. 93, cf. pp. 157, 159)

with the notion that "continual learning would eventually lead us towards this holistic and integrated approach – our ultimate goal."

Steurer (2001) analysed the discourse on sustainable development and concluded two rules and one point of orientation for management (2001, pp. 547-549)[15]:

1. Not more emissions should be emitted, than the ecosystem can process.
2. Seeing renewable resources as "natural capital": Using the renewable resources not faster than their rate of regeneration.
3. Non-renewable resources should be used only, if they are not – somehow – critical or vital [*lebenswichtig*]. However, if such resource are used they have to be substituted.

Also the practical realisation of such management within enterprises is discussed.[16]

In 2003 Ricci et al. asked, "what measures of uncertainty and what causal analysis can improve the management of potentially severe, irreversible or dreaded environmental outcomes?" (p. 1) In their research paper, they examine "how to make environmental management choices when incomplete, inconsistent and complex scientific evidence characterises potentially adverse environmental outcomes" (ibid.). In the context of studying they encountered the critical point "that some believe that environmental decisions should be made without considering costs and benefits" (ibid., p. 2) while "others believe in the opposite proposition: precautionary decision must be guided by the balancing of risks, costs and benefits" (ibid.). Ricci et al. choose the legally enforceable behaviour as basis for discussion; however, this does not solve the problem of balancing. Environmental risk assessment (ERA) is one method used for balancing. Still, ERA undergoes a dilemma. Even if it "provides a potentially valuable societal prioritisation tool, unrivalled, as yet, by any other (Hrudey 1998)[17], it could, through misapplication or lack of care, bypass

[15]Steurer's conclusion overlaps very much with that of Dingler (2003, p. 489).

[16]cf. Schaltegger and Petersen (2002)

[17]Hrudey, S.E. 1998: Quantitative cancer risk assessment - pitfalls and progress, *Issues Environ Sci Technol*, No. 9, pp. 57-90, cited by (Ball 2002, p. 529)

more fundamental concerns and deepen rather than alleviate the very problems it seeks to solve" (Ball 2002, p. 529). For the ongoing discussion between ecologists and economists about the usability of such and others concepts Grima et al. (2003) add the conception of natural capital. Their conclusion includes for instance, that "technology and markets are necessary but not sufficient for development" (Grima, Horton, and Kant 2003, p. 313) and that "'international public goods' such as agricultural research and development [exist. Therefore the discussion contains co-operation dilemmas, too. And] it is unlikely that the private sector alone will develop technology for environmentally fragile areas" (ibid., p. 314). Stagnantly the problem of including external costs into prices is not solved. For that reason a new approach to capitalism is being claimed, which presupposes a new kind of resource management (Reller 2004).

In section 3.2 (p. 14) on sustainable development and the criticism on the hegemonic discourse, it has been pointed out that environmental management (EM) is subject of criticism itself. Therefore, even if the mainstream discourse expresses a task for EM, this task should be carefully considered with regard to the function of itself within the hegemonic sustainable development process.[18]

Since all the paradigms of environmental management intrinsically (maybe with an exception of deep ecology) try to control nature, they have to conceptualise nature within a scientific framework. This aspect has been criticised in 3.2.3 (p. 34). For such control indicators of sustainability are necessary.[19] These indicators carry with them a goal; they cannot be neutral, since they express e.g. what is of what importance to be measured. Therefore, they are political, too.

These points need to be critically reflected within the background of the discourse on sustainable development.

[18]This normative statement can be reasoned because of the task of university as discussed in footnote 6 (p. xiv) and the task to lead towards progress, critically reflecting society (cf. Wolf and Lippert (2005))

[19]Further discussion of sustainability indicators can be found in Steurer (2001, p. 550) and Becker (2003)

5.2.1.3 Co-operation, Economy, and Power

A Dilemma An essential gap exists between the knowledge and potential to act environmentally sound on the one hand and societal action, thus decision-making, on the other hand.

This gap between consciousness and acting can be approached by using the theory of social dilemmas[20]:[21]

> "Many environmental management issues can be defined as allocation problems, e.g., the allocation of rights to use common-pool resources or the allocation of the cost of joint projects. The allocation methods developed in the area of co-operative n-person game theory are most appropriate for these problems because they focus on the conditions for engendering and sustaining the necessary co-operation among the involved stakeholders" (Lejano and Davos 1999).

A paradox exists between the facts that "reciprocity is a basic norm taught in all societies" (Ostrom 1998, p. 10)[22] and the observation that co-operation both often theoretically and often factually does not pay (Lippert and Cengiz 2003). The approach to manage environment and resources nowadays is referred to with the notion of sharing resources (in time and space). Such sharing presupposes reciprocal or even altruistic behaviour.

Bringing About Co-operation If environmental sciences claim that societies should manage resources environmentally sound then it has to be asked, how to make individuals or institutions co-operate. One approach is simply to force them. If enough resources are spent to monitor individuals, this option could be used. However, it is not likely that societies are willing and able to realise such an utopia similar to what George Orwell presented it in *1984*. Even then, exclusion of non-co-operators is difficult to realise: It is "the main source of conflict over environmental resources [...] that exclusion mechanisms are either absent or expensive to enforce" (Anand 2003, p. 233). For that reasons societies are trying to create incentives for individuals to make them co-operate. Since paying the

[20]For social dilemmas cf. e.g. Glance and Huberman (1994)

[21]For other approaches cf. e.g. Linneweber and Kals (1999)

[22]Ostrom, E. 1998: A behavioural approach to the rational choice theory of collective action, *American Political Science Review,*, No. 92, pp. 1-22; cited by (Cremer and Lange 2001, p. S16)

people for environmental sound behaviour would not diminish the social dilemma, different methods are researched into. To illustrate, it can be asked, how to enforce decision makers to make environmentally sound decisions? Is it sufficient to make them accountable, as Cremer, Snyder, and DeWitte (2001) suggest?

This research is now dealing with several fundamental questions in order to examine when it does pay to co-operate or who factually co-operates. Eventually, of course, the question is, how to make institutions co-operate. These questions can be applied to households of arbitrary sizes, be it private or legal persons, firms or governments. Yet, the co-operation problem cannot be solved disregarding the societal context. Individuals and institutions are influenced, and their behaviour is restricted by historical development, by social, and cultural aspects; and they are placed within a network of power-relationships. Any strategy, which does not address both, the individual, respectively the institution and the societal network they are placed into, is at high risk to fail.

Discourse and Societal Restrictions Societies claim responsibility of the individuals, be it managers or consumers, to act sustainable. Yet, even when environmental natural scientists find out what is good to the environment, still the preferences of humans have to be determined in order to achieve a basis for sustainability. These preferences are usually "formed in public discourse" (Söderholm and Sundqvist 2003, p. 333). For that reason research into this field must "also address the instruments and content of political and moral debate" (ibid., p. 333; cf. Giddens (1984 p. 340)[23]).

However, it is well known that political and moral debate does not necessarily lead to intrinsic logical sound behaviour[24]. Thus, even when individuals or institutions agree on moral standards, they do not necessarily act accordingly. This is often simply not possible due to their position in the societal framework in which the realisation of moral

[23] cited by (Morrow and Brown 1994, p. 163)

[24] "Stevens (1991) performed a contingent valuation study of species preservation in New England. A majority of the respondents [79 percent] agreed with the statement that: 'all species of wildlife have a right to live independent of any benefit or harm to people.' Still, when confronted with the WTP question, most of the respondents refused to pay. In other words, they were reluctant to choose between something of instrumental value (private goods) and a true moral position and in this way they applied a decision-making process inconsistent with the welfare economics paradigm" (Söderholm and Sundqvist 2003, p. 340).

standards is restricted by power-relationships.

Power-Relationships and Capitalistic Economy as an Underlying Problem For those institutions who already have gained much power, there is no need to participate in the discourse from the game-theoretical point of view. They can only loose in the short-term, if they co-operate. Even if discourse results in moral standards, which are technically implemented in rules and regulations, institutions can defect, for instance start acting informal, and thus are practically exempted from the former agreement.[25]

Starting from this approach is is also necessary to discuss the situation that "most environmental decision making is a male domain and the impacts of those decisions fall on women" (Redclift and Woodgate 1997, p. 9; cf. pp. 195-203): This definitely deserves the attention of those who shall manage the environment.

Furthermore, van Eeten and Roe (2002, p. 23) directly points to the problem that eco-centered interests are not necessarily also socially needed. They ask: "How are organisation to preserve, restore, and otherwise rehabilitate ecosystems, while ensuring the reliable provision of services (including goods) from those ecosystems?" Without answering this question it can be seen as an example that the de-coupling of services from ecosystems (ibid., pp. 13f.) is an economical project. This rather concrete example leads back, eventually, to the basic problem: "How big *should* [the economic subsystem] be in order to optimise life enjoyment for human beings (recognising the instrumental value of the environment) or for humans and other sentient species (recognising instrumental and intrinsic value)?" (Daly 1994, p. 152) This problem can currently be considered as "the underlying problem" because it would not make sense that the economic subsystem itself strives for sustainability,[26] except of sustained capitalism.[27]

Nevertheless, this subsystem factually holds much power about the world's development. And, if it is taken into account what economists say about that: "the decentralised market solutions that economists are fond of don't work very well in allocating public goods"

[25] cf. (Castelles, Portes, and Benton 1989, p. 28)

[26] cf. Elkins (2002, p. 9 footnote 8)

[27] cf. Woltron (2004) vs. Eblinghaus and Stickler (1996)

(Varian 2003, p. 644): purely private companies are not constructed to seek sustainability. They seek private gain. For the private sector it is simply not efficient enough to allocate public goods to that amount which society needs (p. 656; cf.McDonach and Yaneske (2002)).

Moreover, this discussion directs towards a public debate, which – obscurely – seems to be vanishing: Michelsen (1984) discussed in length the interdependence and relationships of nature and society in many dimensions. However, nowadays, some second- and third-dividend discussions in terms of green taxes seem to be much more of importance than the relation between unemployment, the mode of production, peace and nature.

5.2.1.4 Environmental Management is a Social Process

Past management approaches are lead by the pure belief in growth, technology, and management. This lead to detrimental consequences. However, in the recent years the claim that "it is absolutely necessary to bring up a new generation which no longer shares our deeply rooted subconscious belief in continuous growth: A new generation which no longer desires the forever increasing consumption of space, raw materials, and energy" (Liu, Lipták, and Bouis 1997, p. xv) is getting louder. It is necessary to understand these desires and beliefs[28] in order to influence the management process. So, even if optimism regarding the content exists: "*On the whole, there is considerable optimism that managing commons is not a tragedy after all and that institutions can be designed to eliminate some of the 'potential sources of conflict' in the management of resources*" (Anand 2003, p. 232) – the research approaches into the field have to be renewed: "*There is certainly a crisis in resource management science*" (Berkes and Folke 1998, p. 342).

It is not enough to state that no extreme approach will lead to sustainability (Wiegleb 2003b). In order to influence the environment by management towards sustainability it is prior necessary to go into a discourse with the affected people and agree on moral standards. Then both is needed, local improvement of management (Castellanet and Jordan

[28] Werhane and Gorman (2000, pp. 12-14) calls the cognitive frames and mental pictures – representations in the mind – , which filter experience, "mental models".

2002, p. 6) and improving the conditions and context of management:[29] If management towards sustainability shall be successful, it is not enough to focus on primarily on technical solutions, but the individual acting and decision-making options within a societal framework influenced by historical, cultural, and political developments have to be in the centre.

Such approaches can be found e.g. within Elkins's notion of EM:

> "When we speak of management we refer to a type of action deliberately aimed at directing complex social systems toward the achievement of some objective. In the case of Environmental Management the objective is to control the effects of social action upon the natural environment. Accordingly, environmental management can be considered as the attempt to modify social action with regard to these effects. From this perspective, the object of management is not physical events (the environment) but **social processes** which result in physical events. In order to do so effectively we need an understanding of natural and technical processes (in order to understand these effects). However, the management task is an inherently social activity." (2003)

A similar approach can be found in Underwood's ecological environmental research type 4: Research into the process of management (1998, pp. 128f.). For this way of looking at management it is important to study the individual manager, the individuals being affected by the management, and the conditions and practices of management.

5.2.1.5 Summary: Relation to *ERM*

This analysis points towards two elements, which constitute an external given reason for the subject matter of a scientific field. One element is the societal claim for management and the second element is the problem of co-operation within a societal context towards a given aim: sustainability.

Further, the analysis illustrates that different actors have different tasks. It is one task to research into, what is the "best environmental sound" way of acting; it is a second task to develop machines, which serve those people who are willing to co-operate; and finally it is a different task to research into how to influence the societal framework of institutions and individuals, and the latter, such that the latter co-operate. This last task is worked out as a general fundamental problem of managing environmental and resources

[29] cf. Alvesson and Willmot (1992a)

(of course, only with regard to the used literature, what implies temporal changes of such an analysis).

As has been shown in the mainstream discourse on sustainable development, the EM-approach is regarded with high importance as a solution to the ecological crisis; but also within the preceding parts, the need to critically reflect upon the role of management towards sustainable development has been pointed out. This section leads to the question, and to a framework, how environmental and resource management can be a science aiming at fulfilling the demand on serving society with theories and reasonable tools to engender and facilitate co-operation towards sustainable development.

5.2.2 Rethinking *ERM*

What has been said circumscribes the field in which the management of environment and resources has to be placed. This field is highly value-laden. The corresponding responsibilities will be discussed in the succeeding section.

Now, the defining activity itself shall be started. That a clear definition of *ERM* is needed should no longer be open to doubt. The activity shall be carried through in four steps: First, an already existing definition of *ERM* of BTU (2002) shall be examined. Second, a discussion is required about whether and which changes are crucial. This step includes a reconstruction of the BTU-definition. This leads, third, to a new definition of *ERM*. Fourth, this definition will be delimitated from other concepts. Eventually, this section will conclude with a framework of contextual definitions.

5.2.2.1 Existing Definition of *ERM*

Studying the official flyers of BTU, which provides information to new students, yields:

> "Examining into planning and measures in terms of ecological and economical efficiency; evaluating these under the points of view of environmental and resource management; and developing and putting through corresponding strategies of realisation – graduates of the course of study environmental and resource management devote themselves to these scopes of duties [...]" (BTU 2002, own translation).[30]

[30] "Planungen und Maßnahmen auf ihre ökologische und ökonomische Effizienz überprüfen, sie unter Gesichtspunkten des Umwelt- und Ressourcenmanagements bewerten und entsprechende Strategien der

The head of the course of study, Wiegleb (2003c), supports this definition and he even says that it is fulfilled: *ERM* graduates are able to carry out these duties in the point of views of *ERM*.[31]

However, this definition includes a tautology; that is the following: *ERM* is "evaluating [planning and measures] under the point of views of environmental and resource management". Therefore this definition is not adequate. It is not said, what *ERM* is, using other terms. According to Martin (1985), this disqualifies such an approach for an exact definition.

5.2.2.2 Discussion of the BTU Definition of *ERM*

In the second step, it is possible to change this definition to a form that is qualified. For this aim, it becomes necessary to cancel out the tautology and find other words in place of them. However the BTU (2002) definition has another disadvantage: it is restricted to students. Especially to overcome the latter, it is expected to be helpful to develop a definition, which deals with this human activity *ERM* in general.

The approach shall be based on the following discussion: It has been shown that society expresses a need for the management of the environment and of resources. What is the difference between environment and resources? What is this need exactly? Then, the prior section is reflected briefly and related to the aim of sustainability. Using these points, a stipulative rational reconstruction can be developed: A social activity, which shall – from *then* on – be called "ERM", must seek to satisfy societies' needs, based on the analysis of this paper.

Environment Environment is all that surrounds something. The concept environment is used e.g. for operation systems of computers. This rarely relates to a "natural" environment which ecologists deal with. But, it is the latter environment, which the en-

Umsetzung entwickeln und durchsetzen – diesen Aufgabenfeldern widmen sich die Absolventen des [...] Studiengangs Environmental and Resource Management" (BTU 2002).

[31] "Der Absolvent kann Planungen und Maßnahmen auf ihre ökologische und ökonomische Effizienz überprüfen, sie unter dem Gesichtspunkt des Umwelt- und Ressourcenschutzes bewerten und entsprechende Strategien der Umsetzung entwickeln und durchsetzen" (Wiegleb 2003c).

vironmental discussion (e.g. at UNCED and WSSD) deals with. However, the concept "natural" is very difficult to define.[32] Nevertheless a basic common notion exists upon the term. Therefore, it will be used in order to refer to biotic and abiotic environments of beings, regardless of whether these are influenced more or less by humans. Hence, environment from *now* on in this thesis refers to the natural environment (This does not exclude humans).[33]

Resources Nearly the same holds for the term resource. Resources are everything that can be used for something or someone.[34] Thus, a resource can be anything usable for a computer program. That, again, is not what the environmental discussion deals with. Once more the term "natural" has to be applied. However, it is not only the "natural" resources which this discussion considers. Moreover, the "human" resources such as e.g. pleasure, which is used by the being, who experiences the pleasure itself,[35] or work force and living environment are included. This leads to the critical point that environment can be a resource, thus it is being used. Does anything exist in the environment that is not used or needed by anything else? This can be doubted. Therefore every part of the environment can be considered a resource. From this point of view the term *ERM* does not make sense. However, for practical reasons,[36] the term will continual be used.
Based on these thoughts, the following interpretation shall be used: Analytically resources can be differentiated into those which can easily be sold and those which can rarely be

[32]cf. e.g. Zierhofer (2004), Dinnebier (1996, p. 6, footnote 17), Hull et al. (2003), Schama (1996), Dingler (2003, p. 19), van Eeten and Roe (2002, pp. 24-25), Plumwood (2000, pp. 286f., 308f.), Eckersley (2001, p. 23), or Negri (2003, p. 79)

[33]Thus, this definition (as well as the definition of "resource") is stipulative.

[34]cf. Jones and Hollier (2002, pp. 20-48)

[35]for some critical thoughts on this example cf. Burrell (1992)

[36]These practical (and political) reasons are not the focus of the discussion within this paper. Nevertheless, it can be assumed, that it is not probable that BTU considers renaming the course of study, which currently carries this name; cf. chapter 7, p. 110. Furthermore, since society created this course of study carrying this name, there is a meaning in it. To reveal the meanings would be the task for another study.

sold. As has been shown above, western societies (which used the term to name a course of study) tended and might still tend to think of resources as something that can be used immediately, and the use can be measured in monetary terms (resource-as-commodity).[37] This is the first form of the differentiation. The second form refers to resource-as-non-commodity. Public goods belong to this class.[38] And, if a root of a plant, not-directly-used-by-humans, somewhere in the ground uses some minerals, these minerals belong to the second form. For whatever reason, maybe because individuals wish that least possible competing interests exist and therefore some parts of the environment could be considered as "non-resources", the second form of resource is not named as a resource but as environment.

Need and Task for Management Within the last 40 years a consciousness raised that everything of the environment is part of the ecosystem. Therefore, it has been reasoned, everything has a direct (utilitarian) or indirect use-value, or it has been reasoned that parts of the environment have intrinsic values.[39] For both possibilities, some actors shifted to claim that (nearly) every part of the environment should be protected. However, soon it became clear, that not all parts could be protected without "hurting" the interests of other parts. That is why, competing interests were concluded. Now, society still desires a "good" way of dealing with the varieties of (competing or overlapping) interests. Taking into account that at least western societies experienced a long-lasting phase of professionalism, it is straight forward that society asks for experts, who devote themselves to these varieties of interests in both types of resources.[40] Such experts are likely to be called "managers".

[37] The idea of monetarisation has been criticised already in 3.2.3, p. 31.

[38] Within this paper there is no space to discuss in detail the problems of public goods such as e.g. possibilities to privatise them.

[39] The approaches themselves are not new. However, within the discourse of the environmental crisis they were meeting.

[40] Professionalism means that a number of individuals know much more about a topic (or be it an activity, methods, being educated in certain skills) than others (Weil 2002, pp. 67-69). Those others are called laymen, whereas the professionals can – simplified – also be called experts.
Communication between laymen and experts is considered to be a problem, since experts are socialised

And it is the expressed need of the society that these managers deal with both types of resources: resources-as-commodities and resources-as-non-commodities.

The approach of BTU (2002) therefore nicely says: Students shall learn how to examine and evaluate the interests of economists (which are thought to be advocates for the first form of resources) and ecologists (which are thought to be advocates for the second form of resources). The experts shall use the rational and reasonable weight out interests in order to create a plan what should be done. Furthermore, because of the realisation that it is not satisfying to have dozens of plans of which none is carried out (because of power inequalities), BTU (2002) gives an pragmatic approach: "putting through corresponding strategies of realisation".[41] Scientists who put through something do intervene within society. Therefore, again, – using Habermas (1970) – this activity "is better understood as a form of *social* praxis" (emphasise added, Morrow and Brown (1994, p. 156)) and not as a control of simple (positivist) experiments in natural sciences.

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within the culture of their profession. Outsiders are not able easily to participate in the discourses of the experts, since the socialisation process leads to a special way of formulating thoughts, which thereafter are expressed using language (Marx and Engels 1981, p. 118). Thus, (expert) language is not only influenced culturally and politically with regard to a whole society, but also by the expert culture (cf. Franklin's (1995) approaches section 4.2, p. 50). Eckersley (2001, p. 23) pays attention to the case that such cultures necessarily include certain values and understandings, which are therefore mediated through expert's language. Of course, because of the inclusion of certain – but not other – values, the special way of defining terms leads to the questions: How these processes go on and how are power-relations expressed therein?

Since participation requires communication this brings about Habermas's (1987) question: "How can expert cultures be mediated with everyday practice?" (Morrow and Brown 1994, p. 190). Also Alvesson and Willmot (1992b, pp. 10, 13) consider the roles and conditions of dialogues – especially with regard to the possibility of checking validity claims and creating conflictual awareness. Schack (2004, pp. 152-154) points out that there exist different epistemological approaches to the role of laymen and experts within discourses, and she presents a theoretical framework of environmental communication (including the expert communication problem). Hukkine (1999) discusses in depth expert thinking and environmental institutions. Also van Eeten and Roe (2002, p. 27) discuss that environmental professionals "seek to work with others who share their worldviews" and the hierarchies between different expert cultures as well as their relation to stakeholders (p. 27-31).

[41] cf. Wiegleb (2003c)

Reflection Based on Other Definitions and on the Aim of Sustainability[42] This need is not described fully with this approach. Since it is expressed that this social activity shall be carried out scientifically, a critical reflection of science-lead ER-management approaches is to be included in a new definition of the concept *ERM*.

To contrast, compare Reinhardt's definition of EM as "sustained improvement of eco-efficiency"[43] (1999, p. 214) and the discussion in 3.2.3 (p. 34) and subsection 5.2.1 (p. 59). Taking a critical attitude towards management, it cannot be taken-for-granted that management is a socially and environmentally valuable or neutral activity intrinsically. On the contrary, any management approach could be seen as problematic, since it is rather "potent in its effects upon lives of employees, consumers[, ...] citizens" (Alvesson and Willmot 1992b, p. 1), and especially in the case of *ERM* very probable upon environment and non-human-beings, too.

If, and this is the premiss of this paper, *ERM* aims at sustainable development, then a critical reflection on the causes of un-sustainability (such as in subsection 3.2.3 (p. 30)) needs to be included. It follows that *ERM* should not assume the possibility of exact controlling,[44] but rather use methods, which are more appropriate to complexity and non-linearity. In order to react to the political content of management towards sustainability. *ERM* needs a great deal of communicating with affected people. If *ERM* wants not just to cure the symptoms of problems, but also to approach the causes, it becomes necessary to deal with the societal structural reasons for un-sustainability. To handle the moral reasoning and decison-making, which is included in any decision that is thought to foster sustainability, *ERM* must be based on meta-ethical methodologies.

5.2.2.3 Towards a New Definition of the Concept "ERM"

Third, what has been said indicates that it is neither the expert, who, nor the nature, which are focused on, but a certain way of dealing with resources. Hence, environmental

[42] based on subsection 3.2.5, p. 41.

[43] "Umweltmanagement: dauernde Verbesserung der Ökoeffizienz" (Reinhardt 1999, p. 214)

[44] cf. van Eeten and Roe (2002, pp. 89-92), Castellanet and Jordan (2002, p. 23), Williams (2002, pp. 200-202)

and resource management

> *is a social activity. It consists of: critical, rational, and reasonable analysis; evaluation and weighing out of interests in directly-valued and non-directly-valued objects of the natural and human world; and putting through corresponding strategies seeking sustainable development based on the participation of the affected.*

This social activity shall be referred to – from *now* on – by "ERM".

This activity meets certain problems. One encounters invisible values and interests; power inequalities; incomplete, inconsistent and complex scientific information or data. Briefly said, an irrational world. A large amount of interests is communicated through the public: ERM bumps into "environmental issues", "profit-oriented firms" and "governments talking but not reflecting about sustainable development".

Fortunately, ERM is not the sole activity, which deals with some of these things.[45] For instance:

- ERM can use the knowledge and theories of social science concerning what constitutes an environmental issue.
- ERM can use the natural sciences in order to get information about the natural world.
- ERM can use engineering sciences to integrate their tools into plans and measures.
- ERM can learn from political sciences, how to put through their plans.
- Thus, ERM can receive a lot of support from other disciplines.

Since the activity has to include and work with the information and solutions of other sciences it is an interdisciplinary activity.

Moreover, as ERM seeks sustainable development it has to overcome the traditional problems of the separation of measures for this aim. For example,

[45] "In any defining activity of a confusing and yet significant reality it is helpful to determine, what it is not, in order to distinguish it from the collective consciousness" (Castelles, Portes, and Benton 1989, p. 12).

> "one of the effects of the three sector separation [into society, economy *or* environment] is to encourage a technical fix approach to sustainable development issues. This focuses on pollution control, lower resource use and greenhouse gas trading rather than tackling the deeper issues or seeing the connections between society, economy and the environment" (Giddings, Hopwood, and O'Brien 2002, p. 189).

However, in order to fulfil the demand on the ERM-activity these latter connections have to be analysed and focused on. There is little pressing need for increasing activity which concentrates on the traditional separated measures. This would be the task of traditional sciences. In a straight line, these thoughts direct to the delimitation of ERM from other activities.

5.2.2.4 Delimitation From Other Concepts

Fourth, it makes sense to efficiently distribute the work on different activities.[46] Not every activity can fulfil all tasks. Thus, if an activity is found, which devotes itself to a field that is important to ERM, it should not be tried to assimilate this activity, but exchange the necessary information with this other activity. For example, the analysis of directly-valued and monetarisable interests are already in the key focus of management; natural sciences direct their spotlight on natural resources; ethics studies just weighing up of interests. This list could be continued for a long time. Eventually, it has to be decided, where less or more further activity is needed. It shall be recalled what has been stated often: sole natural, social or engineering sciences obviously were not able to handle the local, regional and global environmental and resource problems until now.

At this point, it is necessary to take up the reasoning about the "fundamental problem" again:[47] The fundamental problem is not that societies do not know what should be done, but that individuals and institutions are not engendered to start co-operation within a societal, political, and economic framework, which does give incentives against co-operation. What is needed is an activity, which focuses on these problems using an interdisciplinary approach. Thus, to realise an activity with such a focus, a lot more knowledge and critical reflection about interdisciplinary management, management within

[46] cf. footnote 45, p. 80

[47] cf. 5.2.1

resistance against change, and management towards co-operation and change of society, are needed.[48]

5.2.2.5 Framework of Contextual Definitions of ERM

Finally, it shall be examined in which context the activity ERM can acquire its necessary additional and update old knowledge. As has been pointed out above, ERM should work on a rational and reasonable basis. This demand favours a critical scientific approach to ERM.

From Kuhn (1970) it is known how fields develop to become sciences. Once research begins, rapidly more research problems will be known. Furthermore, the knowledge needs to be discussed, applied, and transferred to next generations. This is the function of courses of study. Scholars shall debate with the researchers about their findings. They are the ones, who are the potential experts, supposed to be serving the society directly. And, of course, students start research themselves and can transfer what they learned and what they found to the succeeding generation of scholars.

These three approaches to ERM, application, research, and learning/discussing/transferring are illustrated in table Table 5.1 (p. 83).

5.2.3 Disciplinarity and ERM

Finally, what has been said in this section can be summed up in terms of disciplinarity: Heckhausen (1972) defines the expression "subject matter of a discipline" as "circumscribed subsets of observables of a material field" (p. 84). For the case of this paper, ERM, the following material field is determined: ERM is concerned with the human and natural world. It is typical for sciences to overlap largely on the level of material fields (ibid., pp. 83f.). The observable subsets concentrate on the management of directly-valued and non-directly-valued resources by individuals and institutions. The level of theoretical integration of ERM needs only to cover the social activity. Such a restriction seems necessary in order to gain detailed knowledge about the field. However, this does not indicate that students of ERM must not learn about other disciplines, too. Methods for research

[48] cf. Berry, Brewer, Gordon, and Patton (1998, pp. 62f.)

Table 5.1: Framework of contextual definitions of ERM

	Field's name	**Definienda**	**Definientes**
Overall field	*Society*	"ERM"	ERM is a social activity. It consists of: critical, rational, and reasonable analysis; evaluation and weighing out of interests in directly-valued and non-directly-valued objects of the natural and human world; and putting through corresponding strategies seeking sustainable development based on the participation of the affected.
Sub-field	*Science*	"ERM Studies"	A course of study, which is a social setting of students and instructors,[a] realising one form of ERM. Whereas the students learn through being taught by the instructors and through their own educational activities. This activity includes critical discussion of what instructors are presenting. Scholars have the responsibility to transfer their knowledge. The subject matter is the social activity ERM.
		"Research into ERM"	A special type of ERM, which refers to scholars who invest resources (time, labour) in order to describe this social activity, its context and conditions; who explain problems of a this social activity, and find appropriate solutions.

[a]Students, instructors shall from now on also be called "scholars". A differentiation of tasks of these scholars can be found in e.g. Bird (2002, pp. 33f.)

into ERM shall be discussed in the last section of this chapter.

In the next section, however, the resulting responsibilities of a science about such a social activity have to be discussed.

5.3 Goal-Orientation and Responsibilities

What has been said presents ERM as highly value-laden. This section focuses on the consequential aims, which necessitate decision-making, and the resulting responsibilities for the actors (Environmental and resource managers, scholars of ERM). First, some characteristics of goal-oriented sciences are discussed; and second, problems of language are touched.

The section is introduced with the goals of ERM. This guides to the role of goals in environmental professions in general, and then succeeds with the general characteristics of goal-oriented sciences.

Wiegleb (2003c) explains the emergence of ERM as follows: "The demand for a study course of 'Environmental and Resource Management' has resulted from the field of conflict between the university and its changed tasks in society" (translated by EC and IL). First, it is recognised that the societal construct, called university, itself is experiencing a shift in its tasks. However, these tasks also have to be taken by ERM Studies:

> "The study course aims at combining the aspect of internationality with interdisciplinarity. Nowadays economic, political, technological and ecological processes cannot only be looked at on a regional or even national level. In the course of the proceeding globalisation, democratisation and participation the environmental issue transforms as well. Progress and modernisation are not defined by the actual visible changes or the stability of social, economic or ecological systems, but also by their sustainability. The integrative approach of ERM aims at preserving a sustainable society and environment as well as trying to repeal the contradiction between technocratic environmental domination and fundamental critics on technology" (ibid.).

This statement meets Hull et al.'s (2003, p. 2) observation that "applied environmental sciences, like medical sciences, are, for the most part, goal driven [...[49]]. They seek to improve or reduce damage to valued units of nature such as ecosystems, species, humans, crops, and communities." That is why it shall be examined whether special characteristics of goal-oriented sciences exist.

The idea of a goal-oriented science can be explained in more detail: First of all, sciences

[49] cf. e.g. Liu, Lipták, and Bouis (1997, p. xv)

> "try hard to collect all relevant *facts*; they all try to make sure that they get their facts right, that the facts have been checked and rechecked and so the information about them is reliable; they all try to put the propositions they make about the facts in a form in which they can be clearly, unambiguously understood and tested against evidence from which they claim to derive and also against evidence that may become available in the future; they all try to pre-empt or eliminate contradictions between the propositions they make or uphold, so that no two propositions are made that cannot be true at the same time. [...] And they are prepared to be criticised – and retract their assertions – if they [...] present their findings [not] in a *responsible* way." (Bauman 1990, p. 6)

In general it is said that scholarly experts use "similar strategies to collect and process their facts" (ibid.), and they all "share the same general rules of logic to draw and validate (or invalidate) the conclusions from the facts they amassed and verified" (ibid.).[50] Additionally, in chapter 4 it has been shown that all sciences are laden with values.[51] Stanley Milgram's obedience studies are just among the most famous examples (Werhane and Gorman 2000, pp. 4f.). Thus, values and aims are something that all sciences have in common. However, Heckhausen adds: "Disciplines with an emphasis on application and well-established vocational fields are eclectic rather than purist in their epistemological [conceptions] of themselves as sciences." (Heckhausen 1972, p. 86) This leads to an increased personal responsibility of the scholar.

A goal-oriented science belongs to the class of applied sciences. And, of course, every applied science,[52] and even the fundamental sciences, are goal-oriented. The simple problem is that, still, most scientists tend not to recognise their value-laden business (Kuhn (1970), Hull et al. (2003)). On the contrary, sciences like medicine or ERM exist because of their societal aims. The underlying idea of the aims is the emancipation of society from natural

[50] cf. McCuen (1996, pp. 27-36) (American Society of Civil Engineers) and Martin (1985) (Concepts of Science Education)

[51] cf. e.g. Kuhn (1970, pp. 184ff.)

[52] The environmental engineers "are beginning to understand that nature should not be conquered, but protected, that science and technology should not be allowed to evolve as value-free forces, but should be subordinated to serve human values and goals." (Liu, Lipták, and Bouis 1997, p. xv). Whereas the "conquering" is said to be a typical male characteristic (Norgaard 1999, p. 198). Thus one has to prevent reinforcing "patterns of masculinity with socially and ecologically damaging consequences" (ibid., p. 208).

processes and the consequences of humans' actions in nature by controlling nature. Controlling is to be carried through with reason,[53] and is based on decision-making. Werhane and Gorman (2000, pp. 5f.) point at three ethically relevant aspects of decison-making:

1. "Most decisions, even those of science and technology, are choices. Sometimes there is a limited range of alternatives, even, sometimes, one acceptable choice. Still, not every engineer males the acceptable decision in every instance.
2. Such decisions affect people, and an alternative decision (or inaction) would affect them differently.
3. Every decision or set of decisions is embedded in a belief system and culture that presupposes some basic values. For example, Union Carbide's decision to join the Indian government in building the Bophal pesticide plant illustrates how what appeared to be technologically and economic decision have had enormous moral consequences for the company and for Bhopal residents living near the plant."

Some scientists try to analytically distinguish between the products of sciences, which would be neutral, and the application, which only would be ethically relevant (Black 2002, p. 50). However, since the process which leads to the product is also historically, socially, and politically influenced, the product cannot be neutral. Therefore, the products, the intended effects of using the product and the not intended effects could be ethically relevant to the scholar. The responsibility arising from these ethically relevant items is founded not simply on an abstract reasoning but on a societal discourse.[54] Weil (2002, pp. 73-80) differentiates responsibilities of engineers in four types: "to the public, to employers, to clients and to other engineers and the profession as a whole" (p. 73).

Environmental management sciences are used (and bears the risk of being misused) for competing political agendas (Hull et al. 2003, p. 1). Acting (which implies all sorts of management and studies) in a society is ethically relevant, and society (which implies again decision-makers, and science) creates through action the standards of ethical reasoning (Hajduk 2004, p. 441). Thus, it is worthwhile stressing that, EM "is goal-oriented or focused on end points" (Margerum 1999, p. 152). This implies decision-making, and

[53] cf. Dingler (2003, pp. 40f.)

[54] Hajduk (2004, p. 444) briefly discussed the problems of imagining an ideal discourse in the sense of Habermas.

thus, EM-science ought to consider not only the intended effects but also the by-effects and the societal context in which management takes place.

The second point to be introduced is the discussion responsibilities arising from language matters. From the Critical Theory point of view, language is "inherently ambiguous and constitutive" (Alvesson and Willmot 1992b, p. 14). Language is not simply used to refer to "external" objects,[55] but meanings are constructed through language usage. Therefore the question arises, which role does language play in sustaining scientific and social structures, that are relevant for ERM.

Environmental scientists control the technical language, which is used to describe environmental qualities and goals. Therefore, "environmental professionals rather than the social-economic-political process define the qualities of nature that matter" (Hull et al. 2003, p. 11).[56] Of course, they receive feedback from this process, if the nature that some are interested in is directly-valued. However, for eco-centric[57] interests, hence non-directly-valued, less feedback can be expected. Society puts environmental professionals in a position "where they must speak for nature. As experts about the environment, scientists and managers are expected to help society both identify and define the environmental qualities that have rights deserving protection" (ibid.). This is what is a typical effect of professionalism as in other disciplines, too. This argument can be summed up by:

> "A[n environmentally] sustainable society depends upon that society's ability to negotiate and achieve a sustainable environmental quality. Achieving sustainable environmental quality is as much about setting goals as it is about allocating resources and implementing the management to achieve these goals.

[55]The problems of objectivity is discussed in section 4.2. cf. footnote 86 (p. 34)

[56]The degree of controlling technical language, which Hull et al. quantify by putting more weight to the environmental scientist, should be subject of further studies. A circular feedback system can be assumed. Further, the managers are not mere functionaries, but they are both "'victims' as well as perpetrators of discourses and practices that unnecessarily constrain their ways of thinking and acting" (Alvesson and Willmot 1992b, p. 7).

[57]For further discussion on the importance of eco-centrism vs. anthropocentrism for sustainability cf. Dingler (2003, pp. 44, 491)

> The definitions of environmental quality are critical because these definitions serve as the standards, goals, and visions of desired future conditions" (ibid., p. 12).

By putting Hull et al.'s approach into a societal context the responsibility to take into account social implications of these future conditions, and not restrict the approach to solely defining environmental situations, becomes evident. Because of the described (intrinsic) properties of professional language it is necessary "to develop constructs that are not just descriptively precise (hence powerful scientifically at describing situations) but also evaluatively thick (hence powerful politically at making decisions that involve trading off one value for another)" (ibid., p. 11).

Summed up, the two major sources of responsibility of ERM-scholars are:[58]

> "(1) values exist in the technical language used to define environmental quality, despite persistent claims that scientific knowledge is value-neutral and objective; and (2) these values are both appropriate and necessary. Our finding of values imbedded in the language of environmental quality is consistent with claims made by scholars who have long argued that applied ecological science is necessarily normative [...]. Rather than challenge these claims of normativity, or attempt to purge their language of values, environmental professionals should admit that these values exist and act accordingly" (Hull et al. 2003, p. 10).

For those two reasons, Hull et al. say that specialists of environmental knowledge "have an ethical obligation to acknowledge and examine the role that their knowledge plays in defining, negotiating, and ultimately shaping environmental quality" (ibid., p. 1).

The position of environmental sciences professionals in society urges us to reconsider how their position should and could be ethically realised. For example: Is it social just to preserve one factory or one reservation-area for an animal? In an ethical discourse (Habermas 1991b; Habermas 1991a), how can future generations claim sustainability?[59] How to aim at concrete action, considering that different institutions have widely differing concerns?[60] These and similar questions have become evident, will continue to arise, and

[58] the second source has been dealt with in chapter 4 (p. 47) intensively.

[59] The approach of section 3.2 is not sufficiently argued yet, but can just offer a first orientation.

[60] For instance, consider the fundamental differing interests of the three sectors: The first sector wants to conserve power, the second sector aims at making money. And in the case of the environment-interested

therefore have to be discussed in order to create a basis for action.

After this abstract reasoning, the next section provides a more concrete shift to a so-called thought game. This shall illustrate the interwoven elements of the interest of ERM and the responsibilities of ERM-Researchers.

5.4 Example and Thought Game: Environmental Management Systems

It is believed, that "if correct [environmental management systems (EMSs)] are in place firms will operate in an environmentally sound way" (Prakash 1999, p. 323). Of course, it is necessary to discuss how EMS exactly should work. This section, however, does not need to provide this information. Elsewhere this information is found.[61] Rather it focuses on the distinct interest of ERM on EMSs and the resulting responsibilities of researchers. In other words, this section cannot cover the whole example. The illustration shall just emphasise certain points about the subject matter and problems of ERM.

According to Prakash (1999), the function of an EMS is "instead of micro-managing firms' operations in the command-and-control mode" (p. 323) giving the firm operational flexibility. The underlying idea is that the market compared to the government can better determine how to operate within the firm. However, McDonach and Yaneske (2002) point out:

> "The setting of objectives is a central issue for any attempt at systematic management. In practice, these will be set at subsystem level by individual organisations. The central question is then how does an organisation strike the correct balance between its own self interest (Anthropocentric requirements)

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third sector: it has problems to develop co-operation because of e.g. competition... (At least the German environmental movement does not develop a "reasonable division of labour as regards content [...], because internal interests of these organisations are prior to a powerful environmental movement" (translated by IL, (Kolb 2003)).

[61] cf. e.g. Quality Network (2003), Anonymous (2003)

and that of the natural environment (Biospheric[62] requirements)?" (p. 221)

When people are overwhelmed by the promises of EMSs, this question is not often realised. As an instrument of the firm, it serves "for citizens who are torn between downsizing the government and safeguarding the environment, [promising] there is cleaner water and fresher air with fewer laws" (Prakash 1999, p. 323). The problem is, as Prakash finds, that firms do not have incentives to strive for "sustainability" beyond, what law stipulates or what assures monetary gain (ibid., p. 324).[63]

It might seem self-evident:[64] EMSs are in the interest of ERM-Research, since within the recent environmental management discourse much hope is expressed in this tool. This interest lies in the question, how some persons, called ER-managers, within a firm can try to shift the firm towards sustainability. As already mentioned in this paper, firms cannot strive (first-order) for sustainability. Firms usually strive for (a) short-term and (b) gain for its own group: the firms' owners. ERM-Research asks which context allows and engenders (most) sustainability, and how individuals can enhance and influence institutional developments towards sustainability.

These questions are neither answered nor addressed by the natural sciences, and also not by engineering sciences. Merely, it can be answered by a field which focuses on the specific actors, whose duty it is to strive for sustainability, and their social context. The relevant environment of these actors consists of other decision-makers, both higher and lower in hierarchy, and the "technical" staff of a firm, which is supposed to change towards new (more sustainable) practices. The fields of natural and engineering sciences provide ER-managers with the concrete aim and the technical or social tools. However, since management is not done to satisfy the experts but the affected people, participation is needed to learn about the people's needs. Participation, too, can provide answers to defining aims and pre-selecting possible tools. In order to communicate with the stake-

[62] eco-centric

[63] ERM-Research could for instance discuss such approaches as Klassen and Angell (1998) used, when they discussed the influence of environmental regulation contexts on EM in the U.S. and Germany.

[64] Self-evidence depends on a specific socially, historically, and politically shaped situation. If something is self-evident, it is usually not questioned. However, science should critically check whether such statements are true or can be reconstructed. Cf. Czeżowski (2000, pp. 134ff.).

holders, both "internal" experts and people from the "outside", the respective forms of communication have to be studied and corresponding skills developed. Still, the distinct focus of an ERM-Science must be on an ER-manager's problems, its social and political context, and the social toolbox, which she can use to reach her aims.

Furthermore, the task of an ERM-Science must be to critically study the ethical responsibilities of an ER-manager. That is, because an ER-manager will probably serve for the firm as an alibi-consciousness: She will be set in close relation to striving for sustainability.[65] Thus, from the firm's perspective, the sole presence of an ER-manager might satisfy the internal demands for sustainability. Furthermore, an ER-manager might find herself in the dilemma of having success, thus making a process more sustainable, at the costs of outsourcing the less sustainable firm's activity.[66]

This example had elements of a thought game. It was aimed at discovering and illustrating the distinct interest of an ERM-Science in EMSs. Now, it shall be proceeded to a discussion about further essentials, which are needed to carry out ERM scientifically.

5.5 Orientation: Further Essentials for an ERM-Science

What has been said indicates that ERM can only become a science if it develops a distinctive focus on the management of environment and resources. Moreover, it is critical to narrow ERM's approach to the field in order to progress. Of course, research into ERM needs to orientate within the whole field of environmental problems. Thus, anyone who is willing to start research into ERM requires knowledge about the field. Fortunately, this knowledge is provided by different disciplines that focus on other problems. For instance, hydrology can serve with the necessary knowledge underlying water resource problems. However, serving is not being. Hence, hydrology is not ERM; and also the sum of further sciences concerned with environmental problems does not add up to ERM. Rather, ERM

[65] cf. Alvesson and Willmot (1992b, p. 7)

[66] cf. Castelles, Portes, and Benton (1989, p. 28)

has to take an additional perspective, and while taking that consider the interdisciplinary dimension of environmental issues.

Having a notion about the context of the problem, which ERM is concerned with, can definitely lead to better research into the field. For example, it might lead to more promising hypotheses.[67] Since ERM is a social process, mainly studies in the field of people who take and are affected by EM-decisions and act upon the environment are needed.

However, to start research into ERM, more is needed than a notion about the context of the legitimate problems. Even if the respective total environment were known, this would not add up enough to start research into ERM. As shown in chapter 4, a paradigm is needed.

5.5.1 The Need for Methods

These paradigms provide methods and by that constitute a science. But, what exactly is "*a*" or "*the*" scientific method? According to Martin (1985, p. 43) only one differentiation makes sense: There exist *several techniques of sciences*, which are used by different sciences. It is these techniques which are being referred when people speak about *a scientific method* or *scientific methods*.[68] However, these techniques have something in common. That is, by using these techniques all "scientists test their hypotheses by deducting consequences from them ["and comparing these consequences with the evidence"], together with auxiliary hypotheses. Moreover, the general criteria of confirmation or refutation of a hypothesis" (Martin 1985, p. 43) does not differ among the sciences.[69] These general

[67] cf. (Martin 1985, pp. 11-14)

[68] Of course, also different terminological approaches exist. I.e. Crotty (1998, cited by Gray (2004, p. 16)) differentiates between the general epistemology (with regard to objectivism, constructivism, and subjectivism), according theoretical perspectives (i.e. positivism, interpretivism, critical inquiry, feminism, postmodernism), methodology (i.e. experimental research, survey research, grounded theory, action research, discourse analysis), and methods (i.e. sampling, statistical analysis, interview, observation, case study, content analysis).

[69] cf. Berry et al. (1998, p. 57) and Bauman (1990, p. 6). Bird (2002), however, shows problems of picturing the scientific method as a "straightforward process of hypothesis testing" (p. 24) since the actual process of science would be much more subtle and dynamic. For other approaches questioning the

properties of procedure and some others are referred to, when people speak about *the scientific method*.[70]

However, it can be suggested that these methods change over time. What then, is the core of scientific methods? Nowadays, historians of science understand out-dated scientific theories, such as phlogistic chemistry, and "those once current views of nature [...], as a whole, neither less nor more the product of human idiosyncrasy than those current today" (Kuhn 1970, p. 2). Such out-of-date beliefs, one may call them myths, are "produced by the same sorts of methods and held for the same sorts of reasons that now lead to scientific knowledge" (ibid.). Hence, to call these out-of-date beliefs sciences implicates to call their methods and reasons scientific, which are today considered as incompatible with science. Kuhn (1970, pp. 2f.) takes from that: "Out-of-date theories are not in principle unscientific because they have been discarded."

Paradigms (Kuhn 1970) or scientific research programmes (Lakatos 1995) provide a network of facts, concepts, methods, laws, theories, and standards, and all of them can be changed during revolution (Kuhn) or, in Lakatos's terms by transfer from a degenerating to a progressive research programme. The effect, however, is striking: The theory encounters "a displacement of the conceptual network through which scientists view the world" (Kuhn 1970, p. 102). Hence the science is redefined. Usually such a procedure is seen as progress. This goes together with McCuen, who states: "[T]he scientific method is believed to be responsible for the rise of science and technology over the last few centuries." (1996, p. 5) Nevertheless no paradigm and therefore "the scientific method is not infallible" (ibid., p. 25). Dingler (2003, pp. 31f.) (using the ideas of Paul Feyerabend), argues that in modern epistemology it is even needed to change scientific techniques often[71] in order to reveal reality (methodological pluralism [*Methodenpluralismus*]).

This paper explained and defended the need for scientific research into ERM. The pre-

hegemonic ontology cf. e.g. Gray (2004), Seale (2004a).

[70] cf. to section 5.3 (Goal-Orientation and Responsibilities), p. 84

[71] This thought is based on the insight that sticking to a certain technique often prevented gain of knowledge, whereas the "illegitimate" usage of new techniques leads to progress Dingler (2003, p. 31).

ceding paragraphs showed that for ERM to be contemporarily accepted as a science, it is necessary to stick to general accepted techniques and the contemporary scientific method. If ERM were a fully matured science, which it is not (yet), then it could be proceeded with the introduction to the techniques, which are generally used by ERM-Researchers. Unfortunately, this is not possible; moreover the discussion of research techniques in the scientific environment of ERM has only started in the last years. Thus, an introduction to favourite scientific methods, adapted to the needs of ERM, has to be postponed.

Still, requirements for the method can be sketched based on aspects raised in the more general scientific discourse. Two points are worked out in the following: first the difference between research based on an idealised conceptions of ER-managers compared to the aim of getting to know the "reality" of ER-managers is discussed; and second, the need to place the ERM-activity into its social context is hinted at.

First, it is necessary to distinguish between dealing with ERM and looking at the ideal manager, combined with developing tools for this ideal manager with her ideal problems in an ideal context on the one hand, and the material situation of the manager on the other hand. It seems quite helpful to take the materialist's vantage point and look at "the real individuals, their activity and the material conditions under which they [work and] live, both those which they find already existing and those produced by their activity" (Marx and Engels 1981, p. 42). For Marx and Engels it is necessary to take into account the primary activity which humans carry out in a society, which is production. Through production existing structures are reproduced.[72] Derived from them, to pay attention to what and how ER-managers produce is required. Marx and Engels contributed much to sciences of modernity by claiming to recognise the *real* individuals, "not as they may appear in their own or other people's imagination [... but] i.e. as they operate, produce materially, and hence as they work under definite material limits, presuppositions and conditions independently of their own will" (1981, pp. 46f.). This approach, however, experienced a serious drawback, which can be described i.e. with the ideas of Weber

[72]This paragraph does not promote the base-superstructure model for ERM-Research, but using the approach of Marx and Engels to model society as a contradictory whole (totality), which is made up by social reproduction (cf. Morrow and Brown (1994, pp. 90f.)).

(1930),[73] who advocated social enquiry as "examining a socially meaningful world of intersubjective action and interaction" (Filmer et al. 2004, p. 37) rather than enquiry based on "social facts". Thus, the quite positivist vantage point of Marx and Engels has to be reflected with the background that "reality" is socially constructed. Further, it needs to be explicated that advocating the usage of a materialist approach does not mean that voluntary actions of individuals should not be looked at (Morrow and Brown 1994, pp. 54f.). Still, there is no need to mystify the routine of ERM, but to comprehend it as a practical social activity (Marx and Engels 1981, p. 122).

Second, management should be subject of critical research. Usually, "[m]anagement is considered to be a socially valuable technical function, normally acting in the general interest of workers, employers, customers and citizens alike" (Alvesson and Willmot 1992b, p. 1). ER-management is considered to act in the interest of environment, too. For Critical Theory it is appropriate to address also management, since management has dominant effects on the lives of many affected groups (e.g. employees, consumers, citizens). Management is not seen as just an "instrumental form of rationality" (ibid., p. 1), mystified as objective management, but from a standpoint which does not assume the neutrality of management (ibid., p. 4). Whatever methods ERM-Research will use, Critical Theory suggests that the method should be able to formulate problems as complex, ever-changing messes, and not only as isolated and tractable problems, which are simplistic to be dealt with. The social and political conflicts underlying the problems ERM is concerned with have to be revealed and brought forth. Then these conflicts can be used for constructive problem-solving. With regard to the first point, materialism, it is to be pointed out that idealised situations can be used for research, in the sense of utopian ideals – explicit counter pictures to "reality" – which can induce the awareness for problems.[74] Further, it is suggested not to look at practices and the corresponding conditions of management only, but also at the conditions of management and management science discourse.

In general, it is said that qualitative research methods can rather reveal characteristics which nobody ever noticed before, compared to quantitative research, which would be

[73] citey by Filmer, Jenks, Seale, Thoburn, and Walsh (2004, p. 37)

[74] cf. Alvesson and Willmot (1992b, p. 16)

restricted to measure qualities, based on developed indicators, that are already known (Seale 2004b, p. 76). For ERM, however, it seems inappropriate to stick to only one of both methodological approaches; to do so would be biased.

It is the task of current scientists in the field to adapt to already existing or to develop new research techniques. Yet, the adoption of them might strikingly vary with different conceptions about "reality", the social construction of knowledge, and the aims for using them[75]. Based on the preceding discussions, several methodological approaches and theoretical perspectives[76] can be suggested for discussion towards research into ERM. In the following, five approaches shall be introduced, which are chosen because of the aim to promote a rather new scientific field, which looks at a social activity, called ERM, and is supposed to take into account the context of the object and the context of scientific inquiry.

Critical Theory :[77] Speaking with the words of Morrow and Brown, Critical Theory (CT) proposes to grasp society "as a historical totality, rather than as an aggregate of mechanical determinants or abstract functions" (1994, p. 14). This leads to the idea that an analysis of such a society could not be done value-free, "but should be engaged consciously with the process of its transformation" (ibid.). Thus, societal change is intended by CT. This methodological approach is used among all the social science disciplines – even in planning, urban studies, economics, and management.[78] Critical Theory can be recommended for studies because it is interested in "a large number of issues" (Alvesson and Willmot 1992b, p. 9). The CT-approach very much stresses the social context of objects (and subjects) of studies. In the case of

[75]The aims could i.e. be describing "reality", promoting "insight", political "impact", or problem-"solving" (cf. Seale (2004b, p. 72)).

[76]cf. Gray (2004, p. 16)

[77]Here it is neither referred only to the Marxist tradition of Critical Theory nor only to the *Frankfurt School*, which brought about the *Kritische Theorie*, but to the more wide approach of social sciences, which developed since the early *Frankfurt School* world-wide.

[78]cf. Morrow and Brown (1994, p. 11)

researching into ERM, it is not only the social, but also the environmental context, which is of interest. What else is the context of ERM? This question cannot be satisfied here, but a hint is given: management, as a certain type of social interaction, shapes and promotes beliefs, and gendered social realities; it places itself into a position of having superior technical[79] knowledge; and by that undermines democracy (technocracy).[80] The aim of critical management is to consider under-represented groups by understanding management as a political, cultural, and ideological phenomenon; therefore critical ERM should give voice to all, "whose lives are more or less directly affected by the activities and ideology of management" (Alvesson and Willmot 1992b, p. 8). The CT-approach to ERM would try to place ERM in such a way that it does not automatically enhance the hegemonic direction of societal reproduction:[81] Thus not making the ER-manager part "of a well-oiled societal machine" (ibid., p. 10), but so that ERM helps to transform the society based on democratically and discursively developed aims. Deetz (1992, p. 22) points at the need for CT to strive for public decision-making in contrast to corporate decision-making. Critical Theory's "task is to assess the practical structure of hegemonic discourse[82] and so then to counteract systematic communicative distortions[83]" (Alvesson and Willmot 1992b, p. 11). In the ERM-context, it is probable that the ER-manager finds herself as a central, privileged elite – managers are part of the elite structure (ibid., p. 12). A critical ERM-scientist should explore the taken-for-granted

[79] cf. expert knowledge and language: footnote 40, p. 77

[80] cf. Alvesson and Willmot (1992b, p. 5), Illich (1998)

[81] cf. Deetz (1992, p. 22)

[82] which is rather power-laden than neutral and transparent (Deetz 1992, p. 23)

[83] Alvesson and Willmot (based on Forester (1989) and Habermas (1979, 1984)) name the need to counteract systematic communicative distortions in many dimensions, such as deceit, illegitimacy, comprehensability, jargon, misrepresentation, accuracy, honesty, and normatove appropriateness (1992b, p. 11).

assumptions,[84] groupings,[85] and ideologies, that freeze the contemporary social way of dealing with the environment, as well as societal order itself,[86] and based on that she should research into the practice and discourse of ER-managers.

> "The interest is in describing the ways by which managers and workers both become obedient in their own structurally prescribed manner [Burrell 1988, p. 227]. While managers and sometimes owners gain in these structures, the force which drives them is not simply or directly those gains. Rather it is a set of practices and routines which constitute identities and experiences and in doing so provide unproblematic asymmetries, privileged knowledge, and expertise located in some and not others, and in doing so instantiate inclusions and exclusions in decisional processes (Knights and Willmott, 1985)." (Deetz 1992, pp. 26f.)

Thus, developing a CT-approach to ERM would necessitate the dealing with ideologies and conceptions of those who manage the environment or resources.

Feminist Methodology : The feminist approach is appealing because it addresses power relations (Ramazanoğlu and Holland 2004, p. 5). Feminist methodology stems from describing the generation of knowledge as masculinist (ibid., p. 15). Therefore it is asked: "Which and whose knowledges are represented as true, legitimate and authoritative?" (Bäckstrand 2003, p. 29) By that so-called politically neutral or gender-neutral knowledge and methodology is criticised. Since feminist methodology itself strives for knowledge about the gendered situations, different researchers within this methodology take different positions in the continuum between realism and relativism (Ramazanoğlu and Holland 2004, pp. 60-62). Notably the feminist self-description differs much from Gray's (2004, p. 24) "external" approach. The emancipationory approach of feminist methodology is interesting for ERM, since striving for sustainable development requires emancipation from

[84] i.e. about objects, which are socially defined, created, and constructed meanings: What kinds of interests are involved in these meanings? Which social identities are (re)produced (and how) by these meanings? (cf. Deetz (1992, p. 28))

[85] It is necessary to find out how groups and identities are created by classifications and classifying, that are a central theme of management. (cf. Deetz (1992, p. 29))

[86] cf. (Alvesson and Willmot 1992b, p. 13)

its hegemonic discourse. There already exist several approaches to ecofeminism,[87] which are characterised by the theme that "subordination of women and the degradation of environment are connected" (Eckersley 2001, p. 23). This goes together with concerns against material growth and affluence (Rajeswar 2001, p. 22).

Public Ecology : This approach can be characterised as post-modern, trying to influence society, but taking into consideration that scientific knowledge is socially constructed and neither complete nor perfect (Robertson and Hull 2003, p. 400). Thus,

> "[p]ublic ecology entails both process and content. The process is that of a post-modern scientific method: a process that values the participation of extended peer communities composed of a diversity of research specialists, professional policy-makers, concerned citizens and a variety of other stakeholders. The content of public ecology is a biocultural knowledge of dynamic human ecosystems that directly relates to and results from the participatory, democratic processes that distinguish public ecology as a *citizen science*. The primary goal of public ecology is to build common ground among competing beliefs and values for the environment." (ibid., p. 399)

Public ecology can be suggested for ERM because it makes use of critical and feminist methods and applies them in the field of ecology and environmental decision-making.

Action Research : This approach stems from Lewin (1946),[88] who claimed that social science could only advance by research based on experiments in real-life situations with natural social groups (Castellanet and Jordan 2002, p. 20). Since then, several approaches to action research have been developed, which differ i.e. in their degree of replicability, participation of the researched, and in the reason of the research (analytically it can be differentiated whether the research-project is initiated by the researched or the researcher) (ibid., p. 22). Still, overall action research provides "a family of research methodologies which pursue action [...] and research [...] at the same time" (Dick 2003). Usually it is important to involve a critical community,

[87] cf. Norgaard (1999), Plumwood (2000), Kaufman, Ewing, Hyle, Montgomery, and Self (2001)

[88] cited by Castellanet and Jordan (2002, p. 20)

which supports the research process by asking "fresh questions" (Harmse, Pothas, and de Wet 2002, p. 38). For environmental management problems often action research is applicable because solutions cannot simply be found (with positivist approaches), but one has to be created by changing attitudes and behaviour of affected people: "[I]f people work together on a common problem 'clarifying and negotiating' ideas and concerns, they will be more likely to change their minds if their 'joint research' indicates such change is necessary." (Allen 2001)

Operation Research :[89] Operation research (OR) strives to improve the effectiveness of decision-making and problem-solving in organisations (Mingers 1992, p. 90). Its history dates back to the 1930s (Harmse, Pothas, and de Wet 2002, p. 38). In that time it was used to research into military operations (Mingers (1992, p. 92), Midgley and Reynolds (2003)). Initially, OR was seen as a tool for the common good by many socialists,[90] which left traces, such as the recent development of Community OR. However, quantitatively more dominant was the usage of OR in a large number of disciplines based on mathematical methods. With this technical approach, decision models in order to develop optimal solutions are formulated (Malz 1974, p. 402). It was supposed to solve problems[91] with positivist science (Mingers 1992, p. 95): "Messy and complex systems were reduced to that which the technique could handle, and people were just another part component of the system, like machines and money" (ibid., p. 93). So, the control of workforce was optimised. Hence, OR did usually not question social realities, but reproduced them and enhanced their characteristics. Therefore OR is not neutral at all; it suppresses "discussion of ends and objectives in favour of a technical choice of means by 'scientific technicans'" (Mingers 1992, p. 97). From the Marxist point of view, it is evident that technical OR solutions would not reveal the underlying conflicts, but support the status quo. OR can be important for ERM Studies, because the general intention to improve decision-making and problem-solving in organisations is in its interest. I.e.

[89] also called "operations research" and "operational research"; the terms are used synonymously

[90] relatively usual among scientists in the 1930s (Mingers 1992, p. 92)

[91] This shows also that in general OR is action-oriented research (Midgley and Reynolds 2003).

in 1993 the Operations Research Society (GOR) established a work group "which reflected the possibilities of developing and applying Operations Research methods to environmental management" (Haasis, Inderfurth, and Spengler 2001, p. 2).[92] For ERM-Research it seems appealing to use OR, but then it needs to be critically discussed how the research can help to understand and change the situation; thus questioning the otherwise ongoing, or even by mainstream OR enhanced, social reproduction. Looking at decision-making would require to open and clarify the underlying assumptions and mystified interests of the decision-makers. Therefore, Laughlin (1987, p. 490)[93] suggests to research into "*those who have power to effect change in the phenomena being investigated*". Midgley and Reynolds (2003) introduce the use of OR in environmental planning and management, and show that also CT has also been considered in OR application in the environmental field. They consider OR as suitable for EM and planning issues because of three similar interests:

> "First, both have *wide boundaries* in terms of clientele, the range of methodological approaches used and attention to multiple (and often conflicting) values. Second, both traditions have an interest in fostering purposeful *interdisciplinarity*. Third, both OR and environmental planning are concerned with the *implementation* of, as well as the *design* of, planning strategies."

Which research techniques and methods being suitable can only be confirmed within scientific discussion based on practical experience. This line of reasoning leads to a further critical essential for the developing of ERM as a science: What is this required scientific discussion?

5.5.2 Scientific Discussion

It is still continued with the approach that scientific progress is a social process. What is valid and what is not can only be decided within scientific discussions. Methods are

[92] Using OR, research was carried out on "Operational decision-making in product recovery and recycling systems", "Transportation and recycling in reverse logistics networks" and other "Strategic issues in Environmental Management".

[93] cited by Mingers (1992, p. 104)

only one example. In general, the question "What knowledge should be included into the focus of a science?" presupposes scientific discussion. This of course is not a universal fact. On the contrary, it relates to the current scientific method. In medieval times, however, the question of what part of knowledge "was 'important' was often decided by accidental circumstances such as the separation of the texts in the available manuscripts" (Wieruszowski 1966, p. 103). Nowadays, all the reasons shown in chapter 4 (p. 47) and section "Goal-Orientation and Responsibilities" (section 5.3, p. 84) self-evidently[94] demand critical scientific discourse among the interested scholars of any science.

This has good reasons: First of all, a scientific field needs to progress. However, as Kuhn indicates, the "old" generation of a science can only envision the future of a field in terms of "evolution-towards-what-they-know" (Kuhn 1970, pp. 90, 144). In contrast the "young" generation has the ability to envision the future in terms of "evolution-from-actual-knowledge-emanating". It is the young scientific generation, which usually includes new and promising approaches into science. To do that a discussion forum is needed.
Additionally, discussion among scientists can prevent one field from repeating setbacks, which other fields already met. For instance, it should be worthy to council the metascientific discussion of medical sciences. Medical science is similarly goal-oriented like ERM. They, too, encounter such dilemmas as meeting opposing interests, e.g. economical and humanitarian, and it meets criticism on technocracy.[95]
Another important reason, which has to be mentioned, is a practical one: ERM needs to be integrated into the field of EM- and RM-sciences. This is the case, because only if ERM actors understand the community of scientists and start to communicate in their terms, ERM has a chance to "survive". Simply by discussing the field, it is possible to change the current position of the course of study ERM at BTU[96] in the direction towards the

[94] cf. footnote 64, p. 90

[95] The medical model is questioned e.g. by Morrow and Brown (1994, p. 6)

[96] To some students it seems that the current position of the course of study ERM at BTU is isolated. Apparently no relation to EM- or RM-sciences external to BTU is present.

study of – in Kuhn's sense – another world [97]. This other world is the new focus of ERM, which is shared by a scientific community researching in the field. A different approach to the world includes different language and they together, it can be assumed, constitute a different cultural approach to the world. And, as science studies show, and as often in the day-to-day business at BTU is seen, communication between different scientific cultures is not easy. There is more to it than just translation.[98]

Thus, finally it is found that, whether ERM can be a science, depends largely on the researchers' and students' discussion. ERM can be encountered as a science if the ERM scholars "achieve consensus about [its] past and present accomplishments" (Kuhn 1970, p. 161) and agree on a paradigm according to which they study and research.

It is thus the task of the scholars of ERM to discuss how to organise action in order to reach ERM's aims. In the following chapter, the focus will be on the question, how ERM can be approached at BTU. This necessitates some prior thoughts about the role of students. Therefore, the students' perspective and interest, which is influenced and described in the dimensions "employability and teachability of management", will be discussed briefly before.

[97] cf. ibid., pp. 195f.; Morrow and Brown (1994, p. 74)

[98] cf. ibid., pp. 203f.

Chapter 6

Employability and Teachability of Management

Two questions shall be discussed prior to the examination of what has to be considered at BTU for a reform of *ERM*: First, who "uses" an ERM Studies programme? Second, shall and can "management" be taught? If yes, what has to be taken into account? Based on these discussions a working definition of employability for ERM studies-graduates is developed.

6.1 Employability

The aim of an ERM course of study is to produce graduates who are useful for societies. That is one reason why i.e. the German society and others fund the *ERM*-programme. Moreover, it is the students, who have additional interests in *ERM*. What these are exactly has to be examined empirically; but, derived from the dominant mode of production, capitalism, one desire is necessary for economic survival: Many students want to be employed.[1]

Of course, the usability of ERM Studies cannot be evaluated from the present, but from

[1]This approach is based on the assumption that employability analytically can be examined independent of further desires of students.

a future point of view. In terms of effectiveness it is self-evident[2] that ERM will be successful: Going through any course of study causes effects. However, it cannot be known today which effects ERM graduates will generate throughout the next decades and what students receive from that education. Nevertheless, today's knowledge (facts, methods, rules), experience, and skills can be chosen for teaching; those elements that are likely to produce the aimed effects of the activity ERM.

Thus, the efficiency of ERM is difficult to evaluate in short-term. In such circumstances, society usually uses political processes for decision-making.[3] Nevertheless, it can be shown, that graduates are "used" necessarily (Lippert 2003), but it is not known how.[4] Finally, to answer the question, whether students can be employed: ERM graduates can be employed, e.g. by an already existing job-market, by a developing job-market or by self-employment. This goes together with the general assumption, that students of management are more likely to be employed than others. Thus, within the job market competition, probable ERM graduates could enjoy good chances.

This leads straightforward to the discussion of what makes a management-graduate someone who knows about management.[5]

6.2 Management Studies

Using Alvesson and Willmot it has been pointed out in more detail that generally management studies is "devoted to the (scientific) improvement of managerial practice and the functioning of organisations" (1992b, p. 1). In environmental management an example

[2]for the concept "self-evidence" cf. footnote 64, p. 90

[3]Societal decisions about ERM could be: the ERM-programme should be stopped, prolonged, improved, changed, ...

[4]This agrees with Humboldt's idea of the function of higher education (Pasternack 2001)

[5]At Faculty IV of BTU Cottbus discussions about employability of management graduates raise the question, whether lecturers can teach management.

for management studies is represented by the work of van Eeten and Roe (2002).[6]
For the discussion of this chapter it is important to distinguish between "management skills" and "scientific knowledge about management".

Management skills can be classified in the group of social skills. It is "common sense" that ER-managers have to have social skills, as well as pure managers or engineers need these skills.[7] However, some say such skills (also called soft or key skills[8]) shall be taught in distinct lectures for this task,[9] others say they shall be taught within the social process of teaching academic/technical skills (Martin 1985, pp. 67f.). However, Kornwachs (2004a, p. 13) points out that the curricula of engineering programs and those about technology do include little or no social skills that would allow to understand e.g. technology as a social process, too.
An idealised example for the Martin's version is: ERM-students have to work on a case study.[10] Sharing the work is often helpful: If students learn something about their case and they work in teams, they can also gather some practical (and non-scientific) knowledge about communication and management. In Martin's words, "explanatory activity [should be] critically examined from both a logical and epistemological perspective and from a pragmatic perspective." (1985, pp. 67f.) Furthermore, students themselves have to develop the ability to apply creatively the theories, facts, and methods they learned. However, the question "do key skills open up possibilities for our students, or are they [...] means of mass producing employees to meet the demands of a fluctuating job market?" (Peters 2003) continues to exist.

All this differs from *scientific knowledge about management.* Such knowledge contains

[6]They introduce, for example, to management schemes in the environmental field (van Eeten and Roe 2002, pp. 89-92).

[7]cf. Payne, Chelson, and Reavill (1995, p. x) and Bateman and Zeithaml (1993, p. 16)

[8]cf. Peters (2003)

[9]For instance, Payne, Chelson, and Reavill (1995, p. x) give examples for such courses.

[10]The appropriateness of case studies is reasoned by Gorman, Mehalik, and Werhane (2000, pp. 1-3).

theories about the processes of management. If management strives for the optimisation of a process or a situation it has to be asked,[11]

- where the overall and concrete aims come from,
- what are the underlying conflicts that necessitate the management,
- which practices and decision-making models of management exist,
- with which type of problems managers are confronted,
- how and in which context are these problems defined,
- how these problems can be solved,
- what are the effects of management's decision-making to affected people and the environment,
- can the practice be recommended to others as well.[12]

Such questions *can* be the basis of lectures (Alvesson and Willmot (1992a), Bateman and Zeithaml (1993), Payne et al. (1995), Werhane and Gorman (2000), Castellanet and Jordan (2002)).[13]

Managing the environment, however, is a complex activity. The economic subsystem has its respective interests in the management of the environment and resources. These interests can differ from political, public or scientific interests.[14] Therefore, the scientific community has a distinctive task: It is not to educate ER-managers in a way that they fulfil certain economic or political interests "blindly". *It shall be, to educate ER-managers in a way that they can contribute to society through critical thinking, analysis and problem*

[11]This list is not supposed to be comprehensive.

[12]cf. Werhane and Gorman (2000, p. 15)

[13]This paper does not discuss the feasibility related to the competences of BTU.

[14]cf. to footnote 60, p. 89

solving.[15]

For this paper a working definition of "employability with regard to ERM Studies" is needed. Based on the thoughts above and taking into account that university-education can aim at producing

- scholars and scientists,
- professional manpower (so-called human resources), and/or
- the well-educated or well-rounded person[16]

the following definition shall be used:

> *Employability shall be understood as a potential to get a job as a critical employee or to become a critical self-employer.*
> *A course of study ERM is not needed if the graduates are blindly and non-reflecting using accumulated knowledge and techniques. ERM-graduates should not become mechanically reacting, but scientific educated and independent-thinking analysts, who question the practices and discourses of ERM and their effects on the ERM-context critically, as well as responsible, and creative actors in the environmental field*[17]*.*

Nevertheless, it shall be stressed that employability is not the sole criterion of measuring the success of a course of study. On the contrary, for instance it is the task of each course of study, to enable "students to free themselves from the constraints under which they are already thinking and acting" (Barnett 1994, p. 191)[18]. This and further criteria should

[15] cf. Schepp (1990, pp. 124-125), who points out that universities have had the ideal to strive for such a critical attitude, however, he observed that sciences would tend to question less, and secure societal reproduction more.

[16] cf. Ballantine (1983, p. 252), Apostel, Berger, Briggs, and Michaud (1972, p. 9)

[17] which is, of course, a socially constructed field

[18] Barnett, R. (1994). The Limits of Competence. Buckingham: SRHE and Open University Press. Cited by Peters (2003).

master the risk of "putting too much emphasis on '["pure"] employability' " (Reichert and Tauch 2003). Furthermore, this discussion raises the simple and basic question "what fragments of knowledge from which disciplines we should know in order to get the basics for further own development" (Wolf 2003). This question shall be discussed in the next section. However, it cannot be answered comprehensively, because the interests of the affected people of the *ERM* program is not known yet. This paper just can point towards some cornerstones for future discussion within *ERM*.

Chapter 7

Realising ERM: Towards a Reform of BTU's *ERM*-Program

This chapter shall discuss, what a reform of BTU's *ERM* programs has to take into consideration. It is based on two critical assumptions: First, as some members[1] of the *ERM* community perceive the situation, there is a lack of research into ERM BTU. This assumption is accompanied by the notion that comparatively the students are rather interested into ERM.[2] Thus the group of potential scholars of ERM at BTU is considered to exist of mainly students and exceptional some professionals. Therefore, it is believed to be the students who can be the fundamental driving force of ERM including the reform of the course of study with the name "Environmental and Resource Management" at BTU. The second assumption is that those three *ERM* programs will not be closed down. This assumption is based on the current political and financial situation of BTU. So, even if all scientific arguments indicated that the ERM-program should be stopped, the decision-makers would not seriously consider this. The concluding discussion shall argue that the practical consequences of this second assumption are not too bad.

In this chapter three steps to develop a list of legitimate and pressing questions for ERM Studies are used: First, this discussion is placed into a societal frame of the role of

[1] students, and so-called scientists

[2] Whereas most professionals in the *ERM* context are more interested in their traditional research and training fields and not in ERM. Cf. footnote 8 (p. 114).

students in higher education institutions and its reforms. Second, the content of the ideal ERM-program has to be discussed. Finally this leads to the list of questions to ERM.

7.1 Framing the Discussion

In medieval times "it was the serious and enthusiastic student who helped create the university" (Wieruszowski 1966, p. 114). But later, when university was more institutionalised, students' influence was decreased "under the impact of a conventional curriculum and the routine of lectures, exercises and examinations" (ibid.). Nevertheless the type of serious and enthusiastic student must have survived; Thanks to her, change becomes possible. That is why Wieruszowski is able to state:

> "The defects of the medieval system of learning are obvious and well known[: ... The student] was not encouraged to experience the trials and errors of finding out things by himself. Books and authorities rather than things were placed before him, and their basic validity was rarely challenged." (1966, p. 116)

Based on this knowledge at most universities and in most schools progress has been made. However – briefly explained –, in the current frame of political and financial distribution of interests within society, that gained knowledge seems to be disregarded.[3] For this situation Schwab said: "In the ordinary curriculum, [books read and lectures heard] are 'assignments,' not challenges. That is, they are assigned to be 'learned,' and they are presented as official doctrine to be submitted to." (1969, pp. 51f.)

Today, German and other societies seem to value education and critical thinking itself very low. Regardless whether this under-valuation is the cause, in Germany financial resources are saved on the costs of universities, and within universities this leads to competition among the professors on the costs of the students. These processes seem to be responsible for a degeneration of intellectual climate towards not-listening to arguments and not-discussing, not taking into account whether one thinks and tries to participate or not. This of course has negative consequences on the attitude of students. The following quote is still adequate:

[3] cf. Schepp (1990, pp. 124-125)

> "Because of the present intellectual climate, students are willing to put up with considerable drudgery and not a little nonsense in science classes because scientists have convinced them that drudgery and nonsense are necessary for something the students ultimately want. This is pseudorelevance which students have been talked into accepting" (Mayhew and Ford 1972, p. 167).

Concerning the same problem Schwab nicely expressed: The supermarket view of universities focuses on the central fact

> "that protestors are few and the silent, many. Ergo, 'Since the large majority of students tolerate what we are doing now, why change?' If we take the argument as stated there is no reply. If the first principle of education is to expend the minimum energy necessary to satisfy the ignorant client, so be it. It would be a mistake, however, to assume that 'to tolerate' means 'to be satisfied with, to be pleased by.'" (Schwab 1969, pp. 3f.)

Hence, there is a decisive difference between what makes sense and what students can tolerate. It is decisive because having students who participate in and study towards research are more likely to make the field progressing. Instead of drudging practises university should choose what is relevant and significant – to students. "The curriculum should be based upon human needs and structured to make educational sense to students and managerial sense to those responsible for administration" (Mayhew and Ford 1972, pp. xiiif.).

That is exactly why the curriculum is discussed here, yet the curriculum is only one element of criticism. Still, the call for a new curriculum in itself is enough reason to rethink a course of study: The scientific community

> "cannot, then, without self-destruction, set irrational limits to the use of reason, and one of the remarkable paradoxes of reason consists in the fact that it is a proper subject to itself. Rational activity is itself accessible to rational scrutiny. We can not only think but think about our thinking. Such thought about thought is visible and commonplace in most scholarly areas. The scientist thinks [her] argument from evidence to conclusion (and [her] rule of argument). [She] similarly examines the arguments of other scientists. [...] Such thought about thinking is, however, notably uncommon and invisible in the one place which matters most to the collegiate community – its curriculum. As far as students are allowed to see, the curriculum is not a subject of thought; it merely is. In many cases, indeed, thought about curriculum is not merely invisible; it barely occurs. Single courses are sometimes the outcome of single happy thoughts but are rarely accorded the reflexive, critical scrutiny we give as matter of duty and right to our 'scholarly' productions. [...] The curriculum which is a joint intellectual adventure will include itself

> as part of that adventure. One of its subjects will be itself, and this subject, like all other subjects which it treats, will be accessible to the critical scrutiny of its celebrants – faculty and students, separately and together – each in the fashion appropriate to its competence" (Schwab 1969, pp. 245f.).

This critical scrutiny should also take into account the hidden values in a curriculum and explicate them.[4]

Thus, what has to be postulated, is that the criticism on the course of study ERM focuses on the core of ERM, on the scientific substance of ERM.[5] This confirms the necessity of the preceding parts in this paper on the critical discussion of it. The next steps, however, have to be to rethink what a course of study ERM should consist of and where such content should lead.

7.2 Content of an ERM Course of Study

After all, it is possible to apply the abstract arguments on the level of BTU. To do that, this section comprises three steps: Initially, the specific and publicly expressed interests of students in the need for a renewed approach to ERM are explained, and then the recent status of students' discussion about the reform shall be introduced. Finally, the distinct content to be taught about ERM is delineated.

First, it is helpful to recall that an ERM-Science can only progress, if it focuses on a delimited field of problems. Similarly it can be and partly is a fundamental interest of students to find a distinct meaning of ERM[6]: Why should ERM be regarded as interesting, if the meaning of studying ERM is the same meaning as studying environmental engineering, environmental natural sciences, or environmental social sciences?[7] Usually it is the responsibility of the researchers into a field to teach students what is that distinct

[4] cf. Bird (2002, pp. 22f.)

[5] It exists the "Notwendigkeit, die Kritik der Wissenschaften zum Kernstück der Reform [...zu] machen" (Habermas 1969, p. 79).

[6] cf. Rollin (2003)

[7] A common answer that is highly valued among many students is: The current *ERM*-program is a kind of *studium generale* on the environment. This gives students the needed opportunity to study what

meaning of the respective course of study. In the case of *ERM*, taught at BTU, however, the situation is different. As nearly – or really – no research into ERM exists no one can teach ERM. Therefore, it was expectable that some students start to critically discuss ERM and the programme *ERM* among themselves. While professors do not have enough material incentives to start researching into ERM,[8] students are faced with a different situation: Students heavily depend on the ability to state: "I learned to understand X, to do Y, meaning I have the competence-set Z." For students it is not only pressing to be equipped with an explicit, meaningful and distinct knowledge about ERM, moreover it is vital. As everybody else in society, they have to defend what they do (including what they study) facing their own consciousness, but also towards their financial supporters (be it their families, foundations or a state) and what is most important towards the future job market.[9] Thus, as long as X, Y and Z are not supporting the student to develop her character and make the graduate employable as a scientist or as a manager, *ERM* has no right to exist as an own course of study. Henceforward and at the risk of repeating myself, this confirms that the concept of "ERM" must not be used as arbitrary as "sustainable development" with its ill consequences.[10]

In the context of the current *ERM* course of study at BTU it is logical and predictable that students start claiming a reform of the whole program.

Second, what is the current status of student's discussion[11] concerning the content of a renewed course of study ERM? Many students understood that ERM cannot exist isolated from other environment related disciplines. In several proposals how *ERM* should

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they are interested in. Yet, this approach does not directly satisfy the problem that there seems to be little progress in ERM.

[8] German professors have a) a already existing more-or-less working scientific field, with young students who are interested in their respective fields, and b) their secure jobs and wages.

[9] Still, the students own consciousness can be cheated easiest of all these factors. cf. eg. to Mayhew and Ford (1972, pp. xiiif.) (in the preceding subsection) and in terms of cognitive consistency and dissonance to Gleitman, Friedlund, and Reisberg (2000, pp. 373f.)

[10] cf. Giddings, Hopwood, and O'Brien (2002)

[11] In this paragraph it is referred to the public political discourse within *ERM*-relevant institutions.

be reformed,[12] therefore, several students pointed out that the bachelor's program presupposes knowledge about the environment and about that the environment is approached differently from the disciplines. To understand the latter fact, however, no detailed knowledge about all sciences, being somehow related to the environment, is needed. On the contrary, basically it is not important on which examples students learn the variety of approaches towards environment. The role of knowledge about the natural environment is still discussed. However, based on the reasoning of this paper knowledge about the natural environment can essentially be identified as an underlying body of knowledge that needs to be integrated into decision-making. So, this body of knowledge is similar important for the activity ERM as the body of knowledge about social[13] "facts" and processes in general. In consequence, the technical skill[14] of ER-managers is now considered as *knowledge about how to make individuals and institutions question prevailing practices of dealing with the environment and the respective societal discourses, causing change towards more sustainable frameworks and behaviour*.

Furthermore in the public *ERM*-discourse has been agreed upon that ERM has to be approached facing its entangledness with society: Students want to mentally relate ERM, ER-managers and the linked knowledge into society.[15]

Third, what has been said is the basis for an ERM course of study, which should question management towards sustainability. With regard to the bachelor, master and PhD program the following graduation makes sense: The bachelor-program has to include an applicable core of technical skills embedded into knowledge of the natural and human context. The master-program should convey the detailed functions and problems of managing towards sustainability in a narrowed social context. This narrowed social context

[12] cf. Lippert, Hermann, Wolf, Spiegelberg, and Schulze (2003), Lippert and Brandl (2005)

[13] Social sciences include economics. Only, if one wanted to emphasise the relative power of the second sector, it has to be mentioned separately.

[14] "A technical skill is the ability to perform a specialised task that involves a certain method or process" (Bateman and Zeithaml 1993, p. 16); cf. chapter 6 ("Employability and Teachability of Management"), p. 104

[15] cf. Rollin (2003), Wolf and Lippert (2005)

is the context of ER-managers; thus decision-makers, natural scientists, workers and a lot more workers, as well as the surrounding of the institution, citizens, politically represented and not represented humans, and what can be discussed: the bearers of intrinsic value, other living or non-living beings. The PhD-program should be used to develop and test methods and techniques of ERM and gathering knowledge about the practices, discourses and context of ERM[16].

The necessity and feasibility of learning management shall be emphasised once again: Bateman and Zeithaml (1993, pp. 20-25) show that management by "common sense" obviously does not work out:

> "Statistics indicate that only half of the businesses started each year in the United States last 18 months and only 20 percent still exist 10 years later. These data suggest one of two things: Either most of the managers running these businesses lacked common sense, or the typical level of common sense was inadequate to manage a business successfully" (ibid., p. 22).

With regard to the environment, management obviously needs to be more studied: Though natural scientists and engineers aim at protecting the environment for many years and recently also at sustainability, the world's environmental situation still worsens.[17]

It can easily be recognised that it is not possible to include all environmental and social sciences knowledge into the programs. In fact, there is no need to think about that at all. On the contrary, thinking about, how to convey an critical approach to ERM is needed. Therefore, ERM students proposed a promising approach[18] (Lippert, Hermann, Wolf, Spiegelberg, and Schulze 2003). They adapted an analytical framework of MIT – The Social Learning Group (2001, p. 3)[19] in order to assign more detailed questions to the management of the environment (Table 7.1, p. 117).[20] The discussion of this framework

[16] cf. Berry, Brewer, Gordon, and Patton (1998, p. 58)

[17] cf. section 3.1, p. 11

[18] This evaluation is based on the formal acceptation of the approach by the relevant democratic institutions at BTU.

[19] MIT=Massachusetts Institute of Technology

[20] As Castelles et al. so nicely say: "By distinguishing [...] different activities rather than combining them into an undifferentiated whole, it is possible to examine their interrelationships in different contexts."(1989, pp. 15f.)

Table 7.1: Adaptation of a functional framework addressing environmental management

Original approach MIT-SLG	**ERM-Activity related approach**	**Curriculum related approach**
1. Risk assessment: "What is the problem?"	1. Risk assessment: "What is the problem?"	1. Risk assessment: "What is the problem?"
2. Monitoring: "What is happening?"	2. Monitoring: "What is happening?"	2. Monitoring: "What is happening?"
3. Option assessment: "What could be done?"	3. Option assessment: "What could be done?"	3. Option assessment: "What could be done?"
4. Goal and strategy formulation: "What should be done?"	4. Goal and strategy formulation: "What should be done?"	4. *Goal and strategy formulation and evaluation: "What should be done?"*
5. Implementation: "What is being done?"	5. *Implementation: "How can a strategy be realised?"*	5. *Implementation: "How can a strategy be realised?"*
6. Evaluation: "How are we doing?"	6. Evaluation: "How are we doing?"	

can be found elsewhere.[21] However the differences shall be briefly explained. The first list is the original MIT-SLG approach. The second list changes the implementation point in order to master the difference between MIT-SLG's "passive" analysis and ERM's "active" approach. Fortunately, according to Wiegleb and Lippert's (2003) argumentation the questions 4 and 6 can be didactically united during studying: The methods to answer them are based on similar techniques.[22]

This paper argues that ERM-Science should have a distinct critical focus on the management process of environmental issues. Therefore the idea of division of labour recommends to examine, who deals primarily with which questions and how. There is no need to include other disciplines' tasks into ERM-Science (what does not indicate that an ERM program should not include the perspective of those other disciplines). Indeed, not-finding a distinct focus would deteriorate progress of ERM.

The questions 1 to 3 are usually addressed by the already existing environmental disciplines. Questions 1 and 2 are addressable by mono- or oligodisciplinary approaches. Question 3 can be dealt with from an interdisciplinary perspective, and 4 and 5 are typical questions of management and political sciences.[23] Thus, society already produces and receives specialists for those questions. For ERM, a need to substitute those specialists cannot be recognised. However, environmental issues continue to exist. Further purposeful action is needed. Thus, if following Bauman's (1990, pp. 1-19) way of describing the differences between sciences and applying it in our case, two fundamental statements for an ERM course of study are worked out (Table 7.2, p. 119). A course of study taking these two perspectives is called "ERM Studies". Yet, these ERM Studies stayed abstract to a large amount. This shall be changed in the next section. An examination is needed in terms of, what are the concrete and pressing questions and problems that ERM has to focus on and inescapable to deal with.

[21] cf. footnote 8 (p. 9) based on Lippert et al. (2003)

[22] The question "What should be done?" (4) presupposes an evaluation. Such an evaluation in itself is question "How are we doing?" (6). Therefore, they can be combined.

[23] The questions of Table 7.1 are addressed in Table B.1 (p. 138).

Table 7.2: Characteristics of ERM Studies

Addressed	**Statement**
Object of interest	The object of interest is human behaviour resulting in indicated and non-indicated direct environmental and indirect (mediated by social processes) effects on the environment. To explain these effects, of interest are ER-managers activities and her context and their effects on the social and environmental world. Thus, it has to be looked at both, the human-made and the natural world, revealing the underlying conflicts that cause the effects.
Points of view (cognitive perspective)	What is purposeful, how to make people and society not only speak about environmental problems but implement solutions, especially how to realise critical ERM-activity itself, these are the cognitive perspectives of ERM Studies.

7.3 Legitimate Problems of ERM Studies

The legitimacy of problems and questions is constrained by the definition of ERM. Others can only be considered as interesting with regard to their value as auxiliary to ERM and to the individual determined way of education of one student. Thus, first of all, problems must be related to a social activity, which is qualified for seeking sustainability. Of course, it can be questioned, whether an activity suits to striving for sustainability or not. A second characteristic of legitimate problems is that they are concerned with different, often contradicting, interests in directly-valued and non-directly-valued objects. ERM ought not be approached as a simple, linear activity. Third, it is critical that it is asked, how a more sustainable option could be realised.

In case of *ERM*'s bachelor's program it has to be asked what role research occupies. McCuen (1996, p. 19) says about its increasingly vital role in undergraduate education:

> "Generally, a research requirement is instituted to train and prepare students for graduate study and career development by laying a solid foundation in students' understanding of fundamental principles. [...] Research enhances creativity and also develops a student's problem-solving skills."

Thus, it can be emphasised that the primary importance is critically reflecting of so-called fundamental principles of ERM and understanding the relevant problems of ERM-Science, and not learning by heart the principles of any arbitrary environmental science. Based on this, it can be learned how to apply principles of different environmental sciences for problem-solving (training for the activity ERM needs to focus on "how to" in the inter-disciplinary scientific context).

Having defined the three criteria it shall be turned towards the current practise within the *ERM* course of study.

When considering the recent published bachelor theses a wide spectrum is found: On the one hand titles such as "*Reformation of agriculture, overview of current situation, opportunities of Ukraine integration into EU agricultural system*" and "*Analysis of the management and management plans of 1984 and 2002 of the National park Volcan Irazu*" exist. On the other hand *ERM* B.Sc.-theses dealt with "*Morphological and physiological responses of* Carex rostrata *and* Eriophorum angustifolium *to soil oxygen deficiencies*", "*Application of near infrared spectroscopy for the identification of phenols, naphthalens, and BTEX, and characterisation thereof in parafine solutions*" and "*Advanced studies on the defined size reduction of fibrous materials*" (all titles taken from Wiegleb (2003a)). Though this paper is not based on having read these theses, still it can be assumed that these choice of titles mirror different degrees of relevance to ERM: The first two titles seem better fitting to the three criteria of legitimacy than the last three titles. This gap lets the practical question rise, how students and professors could decide whether a topic is relevant or not to ERM.[24] In order to progress, it is suggested that those questions of Table 7.3 (p. 121) should be addressed in each thesis:[25]

[24]The topic "relevancy to ERM" cannot be separated from the needs of the member of the ERM community. Yet, it should be worth it, to separate analytically the relevancy of a topic to the student (and her life), professional scientists (and their life), managers in the field ERM (and their life), and the abstractly defined ERM Studies interests (cf. Table 7.2, p. 119).

[25]The questions of Table 7.3 are addressed in Appendix B (p. 136).

Table 7.3: Questions to be addressed in ERM-Research papers

- In how far and why the topic is ERM-relevant: who, where, when, how uses a resource,
- Who has no or structurally less opportunities to use a resource,
- Which societal practices and structures – which both effect the environment – are reproduced by the observed (and participated) action,
- How the questions given in Table 7.1 (p. 117) are dealt with, respectively answered by the thesis,
- How were dealt with uncertainty[a] in the thesis; what are hard and soft data,
- What the direct and indirect consequences of the thesis should be and/or are.

[a] cf. Berry, Brewer, Gordon, and Patton (1998, p. 57)

The discussion above encourages to think about, which concrete topics are relevant to ERM. Therefore, orientation will be developed by providing same relevant question and concepts. The collection is subdivided into three parts:

1. "Examples of ERM",[26]
2. "Concepts and Conceptions within ERM",[27] and
3. "Meta-questions of ERM".[28]

All the following questions of the three parts are equally legitimate. However, a balanced education would address all categories. This is necessary in order to grasp an idea of all the scientific dimensions of ERM.

[26] see Table 7.4 (p. 122)

[27] see Table 7.5 (p. 123)

[28] see Table 7.6 (p. 124)

Table 7.4: Exemplary listing of ERM-relevant topics: Examples of ERM

Category	**Examples for relevant questions**
Examples of ERM (total dealing with questions of Table 7.1)	• The lake A or forest B: You observe a "problem" – How can management react? Which dimensions of causes exist? How effective can be certain instruments in the short-or in the long-run? • The company C, which pollutes the environment... • The office D, which utilises resources • The product E, which was produced using resources, used needing further resources, reused, and thrown away... • The NPO F, which aims at environmental protection, but does not co-operate with others[a] • The government G promotes non-co-operation by engendering competition about natural "resources" • The ER-Manager H, who is in a certain context – What is the role of ER-managers in society? Which problems do they meet? Whom and what do they effect with their decision-making? • The individual I, who manages her life

[a] cf. e.g. Kolb (2003)

Table 7.5: Exemplary listing of ERM-relevant topics: Concepts and conceptions within ERM

Category	**Examples for relevant questions**
Concepts and Conceptions within ERM	• The City: Which scientific perspective emphasises which characteristics? Which problems and which solutions are known? Development? • Nature/Culture-dualism: What is it? What is culture? What is artificial? In how far does differentiation help?[a] • Military: What is its meaning towards ERM? What is about opportunity costs, and environmental deterioration? Is military used to manage/protect/provide (access to) resources?[b] • Traffic: How can ERM perceive it? • Decision-making and participation: How can it go together? How are discourses characterised? How are the concepts "neutrality" and "objectivity" used? • Destruction, protection, creation: Who has interests in what? • Globalisation, interdisciplinarity, risk, development (LDCs), technology

[a] cf. footnote 32, p. 76

[b] cf. e.g. Michelsen (1984); Roose (2003, p. 69); Atiyah (2002)

Table 7.6: Exemplary listing of ERM-relevant topics: Meta-questions of ERM

Category	**Examples for relevant questions**
Meta-questions of ERM	• What is ERM?[a] • By using which scientific techniques, ERM can gain knowledge?[b] • What role do which values play in ERM-schemata? • How to study ERM-Research?[c] • How to integrate ERM worldwide into the scientific discourse? How can interdisciplinarity and other kinds of disciplinarities be approached? • Barriers of scientific communication and teamwork?[d] • What is the relationship between ERM and Human or Political Ecology?[e] • How can ERM utilise the (epistemological/political) thoughts of Haeckel, Marx, Newton, Habermas, Forrester[f], whosoever?

[a]Comparison of ERM-approaches within e.g. Faculty IV, the BTU, Lusatia, Brandenburg, Germany, EU, Europe, world; thus, local, regional and global scales could be examined. Differentiation according to different working fields: e.g. industry, science, politics; or differentiation according to the three sectors (cf. to footnote 26, p. 71)

[b]cf. Roose (2003, p. 59)

[c]cf. e.g. Berry, Brewer, Gordon, and Patton (1998, pp. 66ff.)

[d]Which type of interfaces between scientific cultures worked out, which not? How can co-operation arise within the environmental sciences?

[e]cf. e.g. Robert Ezra Park, Robertson and Hull (2003)

[f]Keyword "System Dynamics"

Having illustrated this categorisation, it shall be preceded to the last step of this section. In the course of this paper several concrete problems already emerged.[29] However, three aspects need to be emphasised again, and therefore shall be briefly traced:

The history of environmental management : Most sciences (i) value to know how they could emerge, what were their tasks and achievements; and (ii) it is even necessary to study the science's history in order to gather a group of scholars and start normal science business. If examining our history, two approaches are thinkable: One is to start with the concrete and youngest history or to start with the first steps made towards environmental management. With regard to the first approach it should be worthy to study the past years of approaching ERM at BTU. An important indicator could be the bachelor's theses that were quoted above. The second approach could be based on e.g. Jones and Hollier (2002).

Sustainability : All populations, which strive for longest survival, need to be sustainable to achieve this aim. However, the particular individuals or social groups might have conflicting interests.[30] Especially capitalism, that is met worldwide due to economic globalisation-processes, seems to be non-sustainable in itself.[31] Thus, there is a contradiction between two aims of society. However, it is none that can be disregarded: it touches the fundament of societies. For this importance, ERM Studies should start enriching society by reflecting on this dilemma. ERM should also start analysing, which societal institutions and which roles of individuals in which contexts are, why or why not, interested in sustainability.[32] Such an analysis

[29] In this paper several concrete problems emerged: Items are found in "Subject Matter" (section 5.2, p. 59); furthermore in discussions of: interdisciplinarity (section 4.3, p. 53), ethics (Goal-Orientation and Responsibilities, section 5.3, p. 84), EMSs (Example and Thought Game: Environmental Management Systems, section 5.4, p. 89), methodology (Orientation: Further Essentials for an ERM-Science, subsection 5.5.1, p. 92).

[30] The recovering of conflicts in order to place them into public discourse is necessary to progress (cf. Deetz (1992, p. 36)).

[31] cf. 3.2.3.6 "Ruling and Production" (p. 36), and "Power-Relationships and Capitalistic Economy as an Underlying Problem" (p. 71)

[32] Consider for instance that "the application of the precautionary principle has been proposed as one

helps scholars to orientate towards their future jobs, too.[33]

Possibilities of radical reforms: Often when the word "reform" is used, it can be expected that structures are not qualitatively changing. On the contrary to that it has been shown that reforms have to be undertaken, based on public discourse and its results. So, it is the task of ERM to rethink reforms aiming at sustainability,[34] even, and especially when such radical reforms imply by-effects, which force the society to reconsider the current way of financing, working and producing.[35] It follows that ERM has to reflect on its relation to politics and its place within society.[36]

The preceding pages have carried the concretisation as far as it can go in this paper. Nevertheless, they could not provide a conclusion. This shall be postponed to the final section. What needs to be noticed for now especially is that it can be analytically differentiated between the current course of study at BTU, called *ERM*, comprising three programs, and a course of study that this paper envisions in the scientific field of ERM, called ERM Studies. Programs, which orientate on the claim of rethinking themselves, can veritable see themselves as part of the activity ERM. The provided problems in this section sole are not more then a beginning towards such a rethinking-process. Using Habermas's (1969, p. 44) intention: Let us check the borders of realisability of utopias.

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practical way to pursue environmental sustainability [...]. In order to apply this principle, it has to be translated into precautionary actions and this requires a context." (McDonach and Yaneske 2002, p. 217)

[33]Thus, this problem necessitates asking how ERM can be realised in a society. It might be interesting to examine the moral reasoning of ER-managers. How are they able to explain or defend their support of non-sustainable activities?

[34]A concrete problem is i.e.: If the established political, societal and economical arrangements hinder sustainable developments, how to overcome this barrier. Can the conception of "windows for reform" that Kolb (2003) uses in the course of comparing the strategies of globalisation critics and environmental movement using the "Movement Action Success Strategy" (MASS), be utilised?

[35]cf. Habermas (1969, pp. 49f.)

[36]cf. FR (2003)

Chapter 8

Summary, Discussion, and Conclusion

Since it was founded, the course of study *ERM* at BTU undergoes and deserves questioning and discussions. As a result, students have tried to influence the policies of the course of study. However, some of the respective professors seemed not interested in working together with them on envisioning the future of *ERM*. Therefore, students were able to spend considerable more time on elaborating their criticism on *ERM*.

Two reasons exist, why *ERM* has to be rethought: first because students show much interest in the activity of rethinking, and second because BTU's *ERM* programme in itself creates little scientific meaning in terms of aiming at ERM. Starting from these notions of underlying criticisms, the paper discussed, what kind of societal demand for ERM is determinable. It has been found that the hegemonic discourse on sustainable development claims management towards "sustainability." However, the hegemonic approach to sustainable development has been seriously questioned, and it was found that sustainability needs rather to be discussed in the direction of a steady-state-economy than an economy of unlimited growth. Decision-making would result from discourses of all affected people in a society that strives for sustainable development. Although the general idea of EM has been seriously criticised while reflecting the hegemonic discourse, it seems necessary to address management practices – that are supposed to enhance the sustainability of a

given society – also scientifically. ERM shall provide society with both, time to rethink for change of fundamental social practices having environmental effects and for development of concrete proposals for changes of these practices. From this discussion it is concluded that an elaborated conception for the ERM-programs is needed.

The science-theoretic method leads to the reason that ERM's principal *raison d'être* is an external societal need and not only an expressed need of other sciences. Nevertheless, it is the responsibility of environmental professionals to engage in favour of a science, which critically and systematically studies the social activity of managing environment and resources and especially examines how individuals and institutions can be engendered to co-operate towards sustainability. For that reason this paper has aimed at showing, which features an ERM-Science would need. In short, these are: It is necessary to define how to understand ERM. The acceptation or falsification of a proposed definition presupposes a scientific atmosphere allowing critical assessment and discourse. While striving for a distinct science of ERM, several responsibilities of the science and of the respective scholars are encountered. Having defined ERM, research into it can begin. Since research was nearly not found, discussion of methodology is being postponed. "Simple" positivistic approaches were not discussed and criticised in depth in this paper, in order to provide more space for developing constructive methodology proposals. Yet, the myth of objectivity and neutrality and the existence of an ahistorical scientific method has been seriously questioned. From this vantage point, it was possible to show that scientific methods and research techniques based on rethinking materialism, learning from Critical Theory and feminist methodology, taking into account the discourse of Public Ecology, and orienting at action and operation research are promising.

Based on an analysis of expressed societal needs and task&labour distribution of problems within the sciences, the following definition for ERM is stipulated:

> *ERM is a social activity. It consists of: critical, rational, and reasonable analysis; evaluation and weighing out of interests in directly-valued and non-directly-valued objects of the natural and human world; and putting through corresponding strategies seeking sustainable development based on the partici-*

pation of the affected.

This definition masters the differentiation between "environment" and "resources" by linking the first to "non-directly-valued objects" and the latter to "directly-valued objects". Obviously, this definition is highly value-laden, what is quite necessary for applied ecological sciences. Furthermore, this definition copes with the situation that natural sciences focus on the description of the environment, engineering sciences develop technical tools, and research into altering (physical) environmental situations, and social sciences describe society's and individuals' interests in and perceptions of environment. From the criticism on management studies it has been learned to question the neutrality of managers and the myth of objective management. ERM, based on the definition stipulated above, is supposed to serve with the necessary research about how to make societies apply the knowledge offered by other sciences in order to strive for a more sustainable world. Built on the developed definition of ERM and the requirements of a course of study the object of interest of ERM Studies has been clarified:

> *It is human behaviour resulting in indicated and non-indicated direct environmental and indirect (mediated by social processes) effects on the environment. To explain these effects, of interest are ER-managers activities and her context and their effects on the social and environmental world. Thus, it has to be looked at both, the human-made and the natural world, revealing the underlying conflicts which cause the effects.*

"Looking" is lead by the points of view

- *What is purposeful?*
- *How to make people and society not only speak about environmental problems but implement solutions? Especially,*
- *How to realise critical ERM-activity itself?*

Thus, it is necessary to question current discourses of decision-making on environmental issues and ERM practices, instead of their simple reproduction. For illustration: It is one task, learning to develop a paper plan for environmental management systems (EMS),

but it is the special focus of ERM to reveal the relevant social context, and to predict the effects on environment and people of such a paper plan, and both, question and improve its realisation continuously. A course of study, that embodies those definitions, can be called ERM Studies. In consequence it has been illustrated, which problems are legitimate for ERM Studies.

Two major criticisms can be formulated to question the argument of this paper. First, chapter 4 that the function of science being based on Kuhn (1970) might irritate: The doubt could rise whether the whole argument would be changed, if it were based on Popper's work,[1] Lakatos (1995), or even on more recent or elaborated insights of science studies. This question meets a decisive point: Working on Kuhn truly influenced the whole argument. Therefore, it can be supposed, that a different paper would be gained, if another key-source were used. Nevertheless, this problem should exist for a whole class of similar papers and they are not considered as false because on having such a limited perspective. In fact, it is quite typical – indeed necessary – to limit the scope of an argument; otherwise detailed discussion would be very difficult. Hence, the base of reasoning with Kuhn should be considered proper for scientific work (not losing sight of that this paper approaches from one set of perspectives and disregards other points of view). Further, from the epistemological point of view, it is decisive that criticism on modernity is only slightly touched,[2] but not elaborated in detail in this paper.

Second, it is clear that this paper has been constructed by means of a fundamental circular argument: EM strives for sustainability and sustainability claims EM. Taking this as the premise and confronting it with the observation at BTU "The *ERM* programs (B.Sc./M.Sc./PhD) do not put ERM into practice" does not surprise: First, the thesis identifies societal needs for activities towards sustainability and scientific support for the latter (this is the premises). Upon both the subject matter for ERM and the activity ERM itself are defined. Applying these definitions it was possible to discuss the definitions and

[1] cf. i.e. Notturno (2000, pp. 225-254)

[2] Dingler (2003) worked out the analysis of the hegemonic discourse of sustainable development based on postmodern thought.

introduce to practices of BTU's *ERM* programs. The current orientation (or lack of orientation) does not coincide with the orientation towards management that should lead to sustainable development as discussed in this paper (end of the circular argument). To overcome this divergence, future ERM Studies shall primarily focus on what has been identified as legitimate for this field (consequence of the circular argument). The content of ERM has been shaped by the argument that since the hegemonic approach to sustainability has to be criticised also EM aiming at sustainable development has to be criticised. The main criticism was that the hegemonic approaches do not reflect adequately the political content, that requires discourse among the affected. Therefore, it is argued, ERM has to include such discourse and ERM Science has to research into the conditions of discourses in the contexts of ER-managers. Further, the scientific community – as part of the group of affected – claims management practices towards sustainable development. this last step guides back to the premises.

Fortunately, criticism on circular arguments is natural and its matter is logical necessary. Kuhn (1970) has shown in detail that paradigms need to be constructed on circular arguments. How else should one confirm the fundamentals of a field? Thus, this paper could have only aimed at illustrating and convincing those scholars in spe that are open-minded enough to follow the premises. Those scholars in spe, who step into the circle of the argument, could accept its standards; others might refuse that argumentation forever, what would be quite natural, too, since the latter is the basis for Kuhn's "normal science" activity.

Furthermore, it needs to be emphasised that this paper is not a qualitative substitute for a discussion within the affected members of the *ERM* course of study. It is limited to providing a framework for further discussions. For sure, details of the framework can and need to be advanced. Nevertheless, the framework for ERM Studies as a whole is more sophisticated than the present approach towards *ERM*, that is lacking clear and meaningful definitions of central concepts. Therefore, this thesis is a qualitative and usable step towards both, elaborating the discussion of what ERM meaningfully can be, as well as approaching a reform of the *ERM* course of study at BTU.

From Habermas (1969) and others it has been learned that knowledge can only be grasped while it processes. Thus, if it is put into boxes, where movement is prevented, the scientific activity itself is declining. This needs to be kept in mind, when approaching ERM. This paper argued that ERM should be supported by studying it as an own subject. Only if ERM is realised as an own scientific field proper teaching becomes possible.

Nevertheless, this thesis does not indicate that a course of study ERM should devalue other scientific fields. On the contrary, it is argued that it is important to repeat findings of other scientists; however, widening of the students' horizons of problem as well as instruction to scientific methods is far more demanded in order to explore, question, and discuss EM critically.

At the risk of repetition, it must be stressed that the question, how to realise the results of the arguement, if it shall be answered, presupposes the acceptance that the curriculum itself should be seen only as a joint intellectual adventure. The scientific community at BTU needs to discuss and then approve the role of the students in any reforming activity of the curriculum. This paper used the arguments of both Habermas (1969) and Kuhn (1970), who worked out the special task of the young generation: It is to sustain a momentum of change, within both society and science. Thus part of the conclusion is that students of *ERM* at BTU need to discuss new approaches on ERM. Indeed, writing this paper and indicating it as a source for further discussion is one part of that student process. For instance, it has been worked out: Future student action needs to approach the questions of research and methodology. Environmental professionals surely should accompany students advancing towards this dimension. Basically, for starting it can be looked at every case, everything what "is." But an ERM-perspective has to be taken. Therefore, such a perspective has to be elaborated further. However, this cannot happen based only on theoretical considerations, but has to take into account empirical knowledge. That is why a circular process, connecting both mutual dependent aspects – theory and practice – is needed.

The main paths of the map are: More detailed identification of societal needs, focusing on the fundamental problem, starting inquiries into ERM, and rethinking ERM. It is expected to achieve a much more promising and scientific approach to ERM by following

these paths.

Hopefully and finally, a new generation comes up: A generation of critical persons making available expert knowledge; who contextualise, who take into consideration who needs, when and where which resources; and who know diverse mechanisms and tools to influence their social contexts seeking sustainability. This of course, is carrying towards the discussion of utopias. That is, however, to be expected from goal-driven sciences. I described a field that strives for both at the same time, social and environmental change.

Appendix A

Definitions for ERM Studies

ERM : A social activity, which consist of critical, rational and reasonable analysis, evaluation and weighing out of interests in directly-valued and non-directly-valued objects of the natural and human world and putting through corresponding strategies seeking sustainable development based on the participation of the affected. (5.2.2, p. 79)

ERM Studies : A course of study, which is a social setting of students and instructors, realising one form of ERM. Whereas the students learn through being taught by the instructors and through their own educational activities. This activity includes critical discussion of what instructors are presenting. Scholars have the responsibility to transfer their knowledge. The subject matter is the social activity ERM. (Table 5.1, p. 83)

Research into ERM : A special type of ERM, which refers to scholars who invest resources (time, labour) in order to describe this social activity, its context and conditions; who explain problems of a this social activity, and find appropriate solutions. (Table 5.1, p. 83)

Object of interest : The object of interest is human behaviour resulting in indicated and non-indicated direct environmental and indirect (mediated by social processes) effects on the environment. To explain these effects, of interest are ER-managers activities and her context and their effects on the social and environmental world.

Thus, it has to be looked at both, the human-made and the natural world, revealing the underlying conflicts that cause the effects. (Table 7.2, p. 119)

Points of view (cognitive perspective) :

- What is purposeful?
- How to make people and society not only speak about environmental problems but implement solutions? Especially,
- How to realise critical ERM-activity itself?

(Table 7.2, p. 119)

Technical skill of ER-managers : Knowledge about how to make individuals and institutions question prevailing practices of dealing with the environment and the respective societal discourses, causing change towards more sustainable frameworks and behaviour. (section 7.2, p. 115)

Appendix B

Self-reflection on Questions to be Addressed in ERM-Research Papers

The following paragraphs are used to determine the thesis' position in terms of the questions outlined in Table 7.1 (p. 117) and Table 7.3 (p. 121). First general questions are discussed. Second, the specific questions of the functional framework are answered.

As a science-theoretic paper – drafting next steps for the ERM-community – this thesis reproduced and served the ideas: that meta-scientific discourse is necessary, and that students are well able to participate and shape this discourse.

It has been pointed out that this paper is very much based on personal perceptions. Empirical data about the perspectives of students is mainly taken from Lippert, Hermann, Wolf, Spiegelberg, and Schulze (2003).
The theoretic character of the thesis requires to check in how far theories were well- or ill-combined. The checking-process has been started during the early version of the paper as a RFC. Several RFC-versions were accessible in the ERM Forum. I tried to get students' attention for the RFCs using several e-mails (also to the ERM Yahoogroup). The students were introduced to my motivation about the topic and asked to criticise the RFC:

> "we need to discuss, what the concept 'erm' in itself means to us. in the everyday business we experience many different usages of the term, in lectures and

> during our conversations. sometimes, professors make us thinking that there is no 'clear' image of erm. but, that attitude is not acceptable! we have a right to know, what we study. thus, even if the professors are not able or not willing to think about, what erm is, we should start to discuss. having a 'working definition', more of us can participate in reform-discussions.
> ok; this is a brief summary of a motivation, which set me to think in more detail about erm, the idea of definitions and of science in general. can erm be a science? why, or why not? that is what i tried to examine in a paper, which you can find here. i think, your comments on that paper would elaborate the student discussion on ERM. thus, i am waiting for your opinions and counter-arguments!" (ERM Forum)[1]

Further, the more developed paper – as a thesis – is structurally part of scientific discourse: A thesis is checked by at least two scientific professionals, and to the defence of the thesis is being publicly invited (also in ERM Forum).
The direct consequence of the thesis should be enhanced scientific discourse on the aim, definition, and function of ERM activities and of the ERM programs. This shall lead to clarification and enhanced scientific action (e.g. research) towards ERM. Indirectly, the thesis should lead towards more reflected and progressed activity of ER-managers.

Concerning the ERM-Activity related approach of Table 7.1 only short answers are given: Table B.1 (p. 138). The answers are short because of the design of the functional framework for analysing decision-making processes but not theorising.

[1]online retrieved 10. Jan. 2005 from `forum.erm.tu-cottbus.de/viewtopic.php?t=49`.

Table B.1: Reflections on the ERM-Activity related approach

ERM-Activity related approach	**Reflections**
1. Risk assessment: "What is the problem?"	In the BTU discourse no common definition of the concept "ERM" exist. This seems to be an underlying problem that is connected to symptoms such as e.g. little progress in the reform of the *ERM* B.Sc. programme. Another problem is that lecturers are rarely able to relate their teaching to ERM.
2. Monitoring: "What is happening?"	This question cannot not be answered based on this paper. The answer presupposes an empirical analysis of the scientific discourse within and about *ERM*.
3. Option assessment: "What could be done?"	This question cannot not be answered based on this paper.
4. Goal and strategy formulation: "What should be done?"	As a reform of *ERM* is a (partly) accepted political aim change is needed. Therefore "simply continuing as until now" is not an adequate option. It is necessary to create orientation which directs towards change. This thesis tries to provide such orientation. The strategy is to develop and discuss aims within the scientific community.
5. Implementation: "How can a strategy be realised?"	The RFC and this thesis are used for developing orientation. As described above, both forms of communication are part of the scientific discourse, and thus can be seen as an implementation of the strategy.
6. Evaluation: "How are we doing?"	This question cannot not be answered based on this paper. However, at least the RFC has been commented by several members of BTU and the topic has been accepted for a thesis.

Appendix C

List of Journals Relevant to ERM

- Business Strategy and the Environment
- Corporate Social Responsibility and Environmental Management
- Environment and Behaviour
- Environment, Development and Sustainability
- Environmental and Resource Economics
- Environmental Science & Policy
- Ethics and the Environment
- Ethics in Science and Environmental Politics
- Journal of Environment & Development
- Journal of Environmental Economics and Management
- Journal of Environmental Management
- Journal of Environmental Policy and Planning
- Journal of Environmental Psychology
- Organization & Environment

- The Environmentalist
- Women & Environments International Magazine

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